

30jul03 08:23:01 User259284 Session D2320.1

File 155: MEDLINE(R) 1966-2003/Jul W4

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\*File 155: Medline has been reloaded and accession numbers have changed. Please see HELP NEWS 155.

Set	Items	Description
S1	131209	'MAGNETIC RESONANCE IMAGING' OR 'FMRI' OR R18:R21 OR MRI OR MR()IMAG??? OR MAGNETIC()RESONANCE()IMAGING
S2	1169	NMR()IMAG???
S3	131846	S1:S2
S4	162216	'IMPLANTS' OR 'IMPLANTS //DENTAL' OR IMPLANT????????
S5	49	PLATE? ?(2N)SKULL? ?
S6	33227	R1:R5
S7	11886	R7:R8 OR R10
S8	23515	'PROSTHESES AND IMPLANTS'
S9	178242	S4:S8
S10	2741	3AND9
S11	101	BRACHYTHERAPY(2N)SEED???
S12	861	BRACHYTHERAPY/DE AND SEED?????
S13	14756	FOREIGN BODIES
S14	477	S13 AND METAL??????/TI,DE,ID
S15	176	SEED????(2N)THERAP?????
S16	15783	S11:S15
S17	235	3AND16
S18	2924	S10 OR S17
S19	7697	HIP? ?(3N)REPLAC?????
S20	88	3AND19
S21	3000	S18 OR S20
S22	6899	(HAHN OR SPIN)()ECHO????
S23	57	SPINECHO????
S24	3197	(GRADIENT OR FIELD)()ECHO????
S25	1007	GRE OR GRES OR GRADIENTECHO????
S26	82	(DIFFERENT OR SECOND)()PULSE? ?() (SEQUENCE?? OR TRAIN? ?)
S27	5838	(DIFFERENT OR SECOND) (3W) (SEQUENCE?? OR TRAIN? ?)
S28	1121	(DIFFERENT OR SECOND) (3W) PULSE? ?
S29	178	S28 AND (SEQUENCE?? OR TRAIN? ?) (2N) PULSE? ?
S30	5901	S26 OR S27 OR S29
S31	6931	S22:S23
S32	4001	S24:S25
S33	156	21AND31
S34	73	21AND32
S35	8	21AND30
S36	42	33AND34
S37	6852	AU=BERNSTEIN?
S38	5	21AND37
S39	1255	31AND32
S40	0	37AND39
S41	3	37AND30
S42	39	30AND31AND32
S43	11	(STATIONARY OR FIXED OR LOCAT???? OR POSITION?????) AND S36
S44	4	(STATIONARY OR FIXED OR LOCAT???? OR POSITION?????) AND S42
S45	8	(MAGNITUD???? OR INTENSIT?????) AND S42
S46	8	(MAGNITUD???? OR INTENSIT?????) AND S36
S47	3	COMPLEX??? AND S36
S48	2	COMPLEX??? AND S42
S49	1	PHAS??? AND S42
S50	3	PHAS??? AND S36
S51	48	S35 OR S38 OR S41 OR S43:S50
S52	8	S45 NOT S46
S53	200	PHAS??? AND S39
S54	14	S53 AND (STATIONARY OR FIXED OR LOCAT???? OR POSITION?????)
S55	14	S54 NOT S51

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S56      524    IMPLANT????(2N) (MRI OR IMAG????)
S57      290    3AND56
S58        0    57AND39
S59        5    30AND57
S60        0    S59 NOT (S51 OR S55)
S61     1034    S11:S12 OR S15
S62       45    3AND61
S63        1    62AND31
S64        0    62AND32
S65        0    62AND30
S66     659    (IMAG??? OR MRI) (2N) IMPLANT???????
S67     343    3AND66
S68       43    S22:S29 AND S67
S69        3    S68 AND PHAS???
S70     1935    EVALUAT??????(2N) IMPLANT???????
S71       71    3AND70
S72        3    S24:S29 AND S71

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30jul03 09:11:33 User259284 Session D2320.2

SYSTEM:OS - DIALOG OneSearch

File 34:SciSearch(R) Cited Ref Sci 1990-2003/Jul W3  
(c) 2003 Inst for Sci Info

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
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Set	Items	Description
S1	49	CR='MOERLAND MA, 1997, V37, P927, INT J RADIAT ONC'
S2	6	CR='FRANKEL S, 1994, V29, P781, INVEST RADIOL'
S3	55	S1:S2
S4	2	S3 AND PHAS????
S5	8	S3 AND MRI

30jul03 09:20:17 User259284 Session D2320.4

File 73:EMBASE 1974-2003/Jul W3

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\*File 73: Alert feature enhanced for multiple files, duplicates removal, customized scheduling. See HELP ALERT.

Set	Items	Description
S1	356	(IMPLANT??? OR BRACHYTHERAPY) AND (MRI OR IMAG???) (2N) (SEE-D? ? OR IMPLANT??)
S2	10	S1 AND (GRADIENTECHO? OR GRADIENT()ECHO??? OR GRE OR GRES)
S3	22	S1 AND (SPINECHO? OR SPIN()ECHO???? OR HAHN)
S4	0	S1 AND FIELD()ECHO???
S5	7	2AND3

SYSTEM:OS - DIALOG OneSearch

File 34:SciSearch(R) Cited Ref Sci 1990-2003/Jul W3  
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File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
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Set	Items	Description
S1	46	CR='TEITELBAUM GP, 1990, V175, P855, RADIOLOGY':CR='TEITEL-BAUM GP, 1990, V175, P885, RADIOLOGY'
S2	38	S1 AND (MRI OR MR OR MAGNETIC()RESONANCE OR NMR)
S3	6	S2 AND (HAHN OR SPINECHO? OR SPIN()ECHO????)
S4	3	S2 AND (GRE OR GRES OR GRADIENT()ECHO????)
S5	0	S2 AND (FIELD()ECHO???? OR GRADIENTECHO????)
S6	6	S3:S4

5/9/5

DIALOG(R)File 73:EMBASE

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06104123 EMBASE No: 1995134759

Magnetic resonance imaging of titanium anterior cervical spine plating systems

Tominaga T.; Shimizu H.; Kosu K.; Kayama T.; Yoshimoto T.; Cooper P.R.; Sonntag V.K.H.

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Neurosurgery (NEUROSURGERY) (United States) 1995, 36/5 (951-955)

CODEN: NRSRD ISSN: 0148-396X

DOCUMENT TYPE: Journal; Article

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

MAGNETIC RESONANCE IMAGING (MRI) of titanium anterior cervical plating systems and their effect on postoperative images were evaluated ex vivo and in vivo. The Synthes and Caspar plating systems were examined by 0.5- or 1.5- T MRI scanners. A phantom study of these implants showed that in spin-echo modes, the plates and screws were seen as areas of signal loss accompanying a marginal hyperintense band, which was more obvious in higher tesla magnetic fields. Distortion of the magnetic field was more prominent in T2-weighted images. In gradient echo mode, the plate and screws were seen as areas of signal loss larger than the size of the metal because of the magnetic susceptibility effect. Postoperative MRI produced images of the implants similar to those observed ex vivo. The Synthes plating system did not interfere with the evaluation of the spinal cord, and the Caspar screw (which penetrated the posterior cortex of the vertebral body) caused a small artifact to be present at the anterior aspect of the spinal cord. In addition to being able to provide fixation of the cervical spine, titanium anterior cervical plates allow superior MRI of the postoperative spine.

## MEDICAL DESCRIPTORS:

\*cervical spine injury--diagnosis--di; \*cervical spine injury--surgery--su  
 article; bone plate; cervical spine; diagnostic value; human; image quality

63/9/1

DIALOG(R)File 155:MEDLINE(R)

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10922907 97275077 PMID: 9128971

Evaluation of permanent I-125 prostate implants using radiography and magnetic resonance imaging.

Moerland M A; Wijrdeman H K; Beersma R; Bakker C J; Battermann J J

Department of Radiotherapy, University Hospital Utrecht, The Netherlands.

International journal of radiation oncology, biology, physics (UNITED STATES) Mar 1 1997, 37 (4) p927-33, ISSN 0360-3016 Journal Code: 7603616

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Subfile: INDEX MEDICUS

**PURPOSE:** The aim of this study is the evaluation of permanent I-125 prostate implants using radiography and magnetic resonance imaging (MRI). **METHODS AND MATERIALS:** Twenty-one patients underwent radiography on the simulator and MRI within 3 days after implantation of the I-125 seeds. Isocentric radiographs were used for reconstruction of the seed distribution, after which registration with the seed-induced signal voids on MRI provided the seed positions in relation to the prostate. The prostate was contoured on the transversal magnetic resonance images, and dose-volume histograms were computed to evaluate the implants. The validity of the ellipsoidal prostate volume approximation, as applied in preimplant dose calculation, was assessed by comparison of ellipsoidal volumes given by prostate width, height, and length and prostate volumes obtained by a slice-by-slice contouring method, both on postimplant MRI. Prostate volume changes due to postimplant prostate swelling were assessed from radiographs taken at 3 days and 1 month after the implantation. **RESULTS:** The seeds were readily identified on T1-weighted spin-echo images and matched with the seed distribution reconstructed from the isocentric radiographs. The matching error, averaged over 21 patients, amounted to  $1.8 \pm 0.4$  mm (mean  $\pm$  standard deviation). The fractions of the prostate volumes receiving the prescribed matched peripheral dose (MPD) ranged from 32 to 71% (mean  $\pm$  standard deviation:  $60 \pm 10\%$ ). Prostate volumes, obtained by the contouring method on postimplant MRI, were a factor  $1.5 \pm 0.3$  larger than the ellipsoidal volumes given by the prostate dimensions on postimplant MRI. Prostate volumes 3 days after the implantation were a factor  $1.3 \pm 0.2$  larger than the prostate volumes 1 month after the implantation. Registration of the reconstructed seed distribution and the MR images showed inaccuracies in seed placement, for example, two or more seeds clustering together or seeds outside the prostate. **CONCLUSIONS:** Registration of the reconstructed seed distribution and the MR images enabled evaluation of target coverage, which amounted to  $60 \pm 10\%$ . The discrepancy between prescribed dose and realized dose was caused by underestimation of the preimplant prostate volume due to the ellipsoidal approximation, postimplant prostate swelling at the time of evaluation, and inaccuracies in seed placement.

Tags: Human; Male

Descriptors: Brachytherapy--instrumentation--IS; \*Iodine Radioisotopes; \*Prostate; \*Prostatic Neoplasms--radiotherapy--RT; Magnetic Resonance Imaging; Prostate--pathology--PA; Prostate--radiography--RA; Prostatic Neoplasms--pathology--PA; Prostatic Neoplasms--radiography--RA

69/9/3

DIALOG(R) File 155:MEDLINE(R)

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08361345 95049317 PMID: 7960630

Characteristics of magnetic resonance sequences used for imaging silicone gel, saline, and gel-saline implants at low field strengths.

Frankel S; Occhipinti K; Kaufman L; Kramer D; Carlson J; Mineyev M; Friedenthal R

Department of Radiology, University of California, San Francisco.

Investigative radiology (UNITED STATES) Aug 1994; 29 (8) p781-6,  
ISSN 0020-9996 Journal Code: 0045377

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Subfile: INDEX MEDICUS

RATIONALE AND OBJECTIVES. Low-field magnetic resonance imaging (MRI) evaluation of breast implants is described, with emphasis on the capabilities provided by different imaging sequences. METHODS. Open architecture MR images using a .064-T permanent magnet and three-dimensional Fourier transform and inversion recovery sequences were obtained. A breast coil was designed and built for this project. Symptomatic and asymptomatic patients with silicone, saline-silicone and saline implants, and phantoms were part of this study. Phase images were used to differentiate protons in silicone, water, and fat. RESULTS AND CONCLUSIONS. Low-field MRI permitted differentiation of silicone, water, and fat. Implant anatomy and surrounding pathology could be imaged and identified.

Tags: Case Report; Female; Human; Support, Non-U.S. Gov't

Descriptors: Breast Implants; \*Magnetic Resonance Imaging--methods--MT; Adult; Breast--pathology--PA; Breast Diseases --diagnosis--DI; Breast Diseases--etiology--ET; Breast Implants--adverse effects--AE; Gels; Middle Age; Models, Structural; Silicones; Sodium Chloride

51/3,AB,DE/45  
DIALOG(R)File 155:MEDLINE(R)  
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06634652 90260223 PMID: 2343136

**Metallic ballistic fragments: MR imaging safety and artifacts.**

Teitelbaum G P; Yee C A; Van Horn D D; Kim H S; Colletti P M

Department of Radiology, LAC-USC Medical Center 90033.

Radiology (UNITED STATES) Jun 1990; 175 (3) p855-9, ISSN 0033-8419

Journal Code: 0401260

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The ferromagnetism of various bullets and shotgun pellets was tested in vitro. Magnetic deflection showed that four of 21 metallic specimens tested (all bullets) demonstrated marked ferromagnetism. Three of these four were made outside the United States; two of the four were known to contain steel, and the other two were reportedly either copper or copper-nickel-jacketed lead bullets (indicating that the ferromagnetism was due to impurities in the bullet jackets or cores). Ferromagnetic bullets readily rotated within a gelatin phantom in response to magnetic torque. Nonferromagnetic bullets and pellets demonstrated only mild to moderate metal artifact during **spin-echo** and **gradient-echo**

magnetic resonance (**MR**) **imaging**. However, all four of the ferromagnetic bullets produced severe MR artifacts and image distortion. MR studies of seven patients with retained bullets, pellets, or shrapnel were reviewed. In six of the seven, only mild MR artifacts were seen. Only intracranial shrapnel (presumably steel) in one patient created significant artifact. All seven patients with retained bullets and shotgun pellets were imaged safely with MR. However, caution should be exercised with **MR imaging** in the presence of metallic foreign bodies, particularly if they are located near vital neural, vascular, or soft-tissue structures.

Descriptors: **Foreign Bodies--diagnosis--DI; \*Magnetic Resonance Imaging; \*Wounds, Gunshot--diagnosis--DI; Adolescent; Adult; Middle Age**

6/9/3 (Item 3 from file: 34)  
 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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07663854 Genuine Article#: 193PB Number of References: 13  
 Title: **MRI** in patients with intraspinal bullets  
 Author(s): Smugar SS; Schweitzer ME (REPRINT); Hume E  
 Corporate Source: THOMAS JEFFERSON UNIV HOSP,DEPT RADIOL, 132 S 10TH ST,  
 1096 MAIN BLDG/PHILADELPHIA//PA/19107 (REPRINT); THOMAS JEFFERSON UNIV  
 HOSP,DEPT RADIOL/PHILADELPHIA//PA/19107  
 Journal: JMRI-JOURNAL OF MAGNETIC RESONANCE IMAGING, 1999; V9, N1 (JAN), P  
 151-153  
 ISSN: 1053-1807 Publication date: 19990100  
 Publisher: JOHN WILEY & SONS INC, 605 THIRD AVE, NEW YORK, NY 10158-0012  
 Language: English Document Type: ARTICLE  
 Geographic Location: USA  
 Subfile: CC CLIN--Current Contents, Clinical Medicine  
 Journal Subject Category: RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING  
 Abstract: The purpose of this study was to determine whether neurologic  
 sequelae occur in patients with intraspinal bullets or bullet fragments  
 who undergo **magnetic resonance** imaging (**MRI**).  
 Nineteen patients with bullets or bullet fragments adjacent to the cord  
 or nerve roots underwent clinical **MRI** studies at 1.5 T Sequences  
 included conventional **spin echo**, fast **spin echo**  
 , gradient-recalled echo, and inversion recovery. Patients were queried  
 during scanning for symptoms of discomfort, pain, or change in  
 neurologic status. Detailed neurologic examinations were performed  
 prior to **MRI** (baseline), post **MRI**, and at the patients'  
 discharge. Sixteen patients were completely paralyzed (ASIA-A), and  
 three were not paralyzed. The length of time from injury was 2-24  
 months. No patients experienced pain or discomfort during the  
 procedure. No change in neurologic status occurred. Follow-up  
 radiographic studies showed no bullet movement following the scanning.  
 We conclude that in patients with complete spinal cord injury,  
**MRI** in patients with intraspinal bullets may be performed. J.  
 Magn. Reson. Imaging 1999;9:151-153, (C) 1999 Wiley-Liss, Inc.  
 Descriptors--Author Keywords: **MRI** complications ; osteomyelitis ;  
 infection ; paralysis ; ballistics  
 Identifiers--KeyWord Plus(R): BIOMEDICAL IMPLANTS; GUNSHOT WOUNDS; SAFETY;  
 ARTIFACTS; INJURIES; DEVICES

## Clinical Not

# MRI in Patients With Intraspinous Bullets

Steven S. Smugar, MD, Mark E. Schweitzer, MD, and Eric Hume, MD

The purpose of this study was to determine whether neurologic sequelae occur in patients with intraspinal bullets or bullet fragments who undergo magnetic resonance imaging (MRI). Nineteen patients with bullets or bullet fragments adjacent to the cord or nerve roots underwent clinical MRI studies at 1.5 T. Sequences included conventional spin echo, fast spin echo, gradient-recalled echo, and inversion recovery. Patients were queried during scanning for symptoms of discomfort, pain, or change in neurologic status. Detailed neurologic examinations were performed prior to MRI (baseline), post MRI, and at the patients' discharge. Sixteen patients were completely paralyzed (ASIA-A), and three were not paralyzed. The length of time from injury was 2-24 months. No patients experienced pain or discomfort during the procedure. No change in neurologic status occurred. Follow-up radiographic studies showed no bullet movement following the scanning. We conclude that in patients with complete spinal cord injury, MRI in patients with intraspinal bullets may be performed. *J. Magn. Reson. Imaging* 1999;9:151-153. © 1999 Wiley-Liss, Inc.

**Index terms:** MRI complications; osteomyelitis; infection; paralysis; ballistics

METALLIC IMPLANTS and foreign bodies have been considered relative contraindications to magnetic resonance imaging (MRI). In particular, if they are located near the spinal cord they have been considered absolute contraindications due to the potential for object movement, dislodgment, or thermal injury from heating effects. Previous studies have examined the relative hazards of MRI of patients with pacemakers (7), cervical fixation devices (1), hemodynamic clips (5), cochlear implants, ocular implants (9), aneurysm clips, dental implants, prosthetic heart valves, orthopedic implants, contraceptive diaphragms, and cerebral ventricular shunt tube connectors (8).

Past in vitro studies have examined deflection forces and MR artifacts of air gun pellets (4) and bullets (3), taking into account bullet composition and ferromagnetic properties. Since no previous study had determined the effect of MRI on physical or neurological status of patients who had intraspinal bullets in vivo, we set out to determine what effect, if any, MRI had on this patient population.

## MATERIALS AND METHODS

Nineteen patients with bullets or bullet fragments in or near their spinal cords who subsequently underwent MRI were studied. Because of the potential risk, all patients signed informed consents for these clinical examinations after both radiologists and referring clinicians carefully explained the benefits and risks. Since no patient refused to sign an informed consent, subjects were consecutive spinal cord injury patients with suspected osteomyelitis and equivocal routine radiographs.

Initial bullet location was determined from previous plain radiographs or computed tomography (CT) images, and follow-up radiographs/CT images were utilized to determine if there was any change in bullet position. Information regarding the date, level, and American Spinal Injury Association (ASIA) (Table 1) classification of injury were obtained from inpatient records.

Imaging was performed with a 1.5 T magnet, and sequences included T1- and T2-weighted conventional spin echo, fast spin echo, gradient echo, and inversion recovery. Studies were performed both before and after intravenous gadolinium infusion.

Patients' neurological status on admission was compared with that after any MRI procedure at each date during admission, as well as with that obtained upon discharge. Referring clinicians were requested to do meticulous neurological exams after MRI. Technologists were requested to be vigilant in noting patients' pain, warmth, or discomfort during MRI.

All patients were males ranging in age from 21 to 48 years. One was of Hispanic origin, 2 were Caucasian, and the remaining 16 were African American. The levels of injury ranged from C4 to T12, with 16 subjects classified as ASIA-A injuries. The remaining three patients had bullets in or near the spinal canal, but were not paralyzed (ASIA). The length of time from the initial injury to the MR study ranged from 2 months to 24 years. All but one of the subjects had retained intracranial bullets, who had retained buckshot.

## RESULTS

None of the 19 patients suffered any change in neurological or physical status as a result of MRI. In addition, no patient reported any discomfort during the course of the MR study. Also, no subsequent plain radiographs or CT images showed any bullet rotation or migration.

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Table 1  
ASIA Classification

0	A	Complete lesion
1	B	Preserved perianal and/or deep sensation
2	C	Preserved motor (nonfunctional)
3	D	Preserved motor (functional)
4	E	Complete neurological recovery
5	N/A	Unknown status

## DISCUSSION

Although it is a relatively new modality, in specific situations MRI is not only the test of choice, but it may be the only test available with which a suspected diagnosis may be made. In our institution, we have a large population of patients with spinal cord injuries who develop or are suspected of developing osteomyelitis. Scintigraphy and CT imaging are inaccurate in this situation (11,12), thus necessitating MRI to confirm clinical suspicion and limit the scope of surgery, as well as to minimize post-operative recovery. Subsequently, a precise mapping of infection is needed, which was felt by our clinicians to be provided only by MRI.

As with patients who have metallic cervical fixation devices and orthopedic prostheses, patients with retained bullets or bullet fragments often require MRI either early in treatment to determine the extent of injury, or later, as follow-up to assess the degree of improvement or exacerbation of injury. In particular, MRI may be required to assess complications related to their injuries such as decubitus ulcerations and suspected osteomyelitis.

As previously discussed, however, MRI can be particularly dangerous when metallic objects are located near vital vascular, neural, or soft tissue structures. Several studies examined the use of MRI of patients with metallic implants and determined a number of absolute contraindications to this procedure (1-9) (Table 2). Additionally, other studies showed that the hazard of MRI of metallic objects was due to the object's potential for movement or displacement, as well as a thermal heating effect (1-13).

The potential for implant movement is intimately related to several factors, including ferromagnetism (3), mass, location, orientation/shape (4,9,10), and duration of implantation (2,8). With regard to ferromagnetism, bullets composed of or encased in steel, copper, or copper-nickel have demonstrated significant deflection force. Those composed purely of lead have shown no such deflection (3). It should be noted, however, that even "lead" bullets frequently contain metallic impuri-

ties (3), thus rendering those bullets ferromagnetic. Interestingly, previous studies have found that domestically produced bullets and shotgun pellets that are most likely to be encountered in criminal and police shootings are nonferromagnetic (3). Clearly this finding should not be assumed to be absolute and universal, due to the serious potential harm patients could suffer during MRI. To the same point, Shellock et al (13) note that shotgun pellet composition differs in different regions of the United States; the federal government requires steel pellets for duck hunting eastern United States.

With respect to mass, a bullet's degree of attraction in a magnetic field can be determined from the equation for deflection force,  $F = mg \sin q / \cos q$  (where  $m$  = mass,  $g$  = gravitational acceleration, and  $q$  = the deflection angle). From this equation we can extrapolate that in all situations in which  $g > 0$ , mass is directly proportional to deflection force. Therefore, the larger the bullet or bullet fragment, the greater the potential for movement in the MR scanner.

The shape of the bullet or pellet affects the physics of magnetic forces. The typical oblong bullet rotates to align itself along its long axis, and the magnetic torque exerted on it is maximal when it is oriented perpendicular to the magnetic field. Thus, a bullet oriented parallel to the field will not rotate upon imaging, whereas one oriented perpendicularly will rotate significantly. As for longitudinal migration of bullets, no noticeable movement was noted in previous in vitro studies (3). An important factor to consider, however, is that many civilian (as opposed to military) bullets are not required to have a full metal jacket (a metal jacket that completely covers the bullet tip), making them more likely to deform or fragment in tissue (9). Additionally, other civilian bullets may be of the soft-point or hollow-point variety, which deform into a mushroom shape upon impact. The deformation of the tip increases both the surface areas of the bullet tip and the wound severity (9). In fact, a mushroomed diameter 2.5 times greater than the original diameter of the bullet produces a wound 6.25 times greater than that produced by an undeformed bullet (9). Clearly, a deformed or fragmented bullet as described above makes predicting potential migration in a magnetic field much more difficult.

Another shape likely to be encountered in ballistic wounds is a sphere, as seen with buckshot or BBs. Such spherical objects have no rotational axis like an oblong object and are more subject to longitudinal migration than their oblong counterparts (4).

Of particular importance when considering MRI effects on metallic foreign bodies is the duration the object has been lodged. Soon after implantation, little healing has occurred, and the surrounding tissue offers little resistance to movement. As time passes, fibrosis and granulation tissue surrounding the object increases, thus opposing the magnetic forces exerted on the object (8).

Location of the bullet is of paramount importance since the risk of potential internal damage from bullet

Table 2  
Absolute Contraindications to MRI

Cochlear implants
Ocular foreign bodies
Starr-Edwards heart valve (pre-6000)
Aneurysmal clips (intracranial)
Wire of pacemaker left in patient
Intrauterine devices with metal loop
Permanent transcutaneous electrical stimulation (TENS) units
Magnetic-sensitive cardiac pacemaker

movement is significantly increased when the bullet is located near vascular, soft tissue, or neural structures.

Heating of the bullet and surrounding tissues is another potential hazard to consider. While bullets themselves have not been studied exclusively or with respect to heating, several studies have reported on the factors that influence implant heating potential. Among these are object composition, conductivity, size, geometry, distance from the coil, field strength, and imaging sequence parameters (1,5). Materials with low or no ferromagnetic properties such as titanium, aluminum, and stainless steel (non-ferromagnetic form) demonstrated negligible heating both internally and externally regardless of size of the implant (1,6). In terms of size, the smaller the object, the lower the heating potential (for a given sequence), and small magnetic foreign bodies composed of steel or copper show unremarkable heating effects (5). It should be noted that with respect to overall safety, implant displacement represents greater danger than heating (8).

Aside from patient safety, another consideration is how the bullets affect image quality. In our study, the bullets and fragments were not located in or near the anatomy of interest (areas of suspected osteomyelitis), and therefore we cannot report first-hand on any degradation of image quality. A previous study of ballistic fragments (3) showed that nonferromagnetic bullets created only mild to moderate artifacts. Ferromagnetic bullets, on the other hand, created severe black hole artifacts with significant image distortion. In addition, pellets in the extremities produced a low level of artifact. Avoiding gradient-recalled echo sequences, and fat suppression, minimizing TES, utilizing fast spin-echo images, and widening bandwidth all will minimize artifacts.

The hazard of MRI of patients with bullet fragments is small but significant. Teitelbaum et al (3) noted that, while the above considerations are important theoretically, it is usually impossible to determine the make or caliber of a bullet accurately on the basis of plain radiographs. It is necessary, therefore, to rely on spent cartridges obtained by investigators at a crime scene to determine such factors before MRI is attempted. Unfortunately, this information may be unavailable.

In addition, Oliver et al (4) suggested that a clinical decision must be made on the balance between the benefit to be gained from MRI and the risk to the patient from movement of an embedded pellet (or bullet). If the decision is made to proceed with MRI, the procedure should be done so with informed consent and performed very slowly. Should any relevant symptoms develop, the study should be stopped immediately.

While our study showed no adverse effects of MRI of patients with retained bullets, it was limited by certain factors. Among these are the relatively small sample size and the fact that we examined a population at only one institution with an MR of high field strength. Additionally, we cannot comment on loss of image quality due to artifact since the MR exams were used to study sequelae

of the gunshot wound (i.e., osteomyelitis secondary to paralysis) rather than the area of primary injury itself.

With the above limitations in mind, it appears that patients with retained bullets in the spinal canal may be safely imaged after careful examination and discussion regarding the risks and benefits of such an imaging modality. It should also be noted that while 2 of the 19 subjects had been imaged within a year of the initial injury, the rest were imaged an average of 5–6 years after the injury. Although the two patients imaged within a year showed no adverse effects from MRI, the results of this study should not necessarily be applied universally to more recent spinal injuries. Also, most of our patients were ASIA-A (complete lesions), the typical patient most at risk for osteomyelitis. Consequently, we have no detailed data on incomplete neurologic injuries. It should also be noted that while it may seem that patients with complete lesions have little to lose neurologically by undergoing MRI, their condition could be exacerbated secondary to a syrinx or superior bullet migration leading to a higher level lesion. We did have three non-paralyzed patients in the study, none of which suffered any neurological or physical effects from MRI. Because of the small sample size of this particular patient population, however, further study is needed before a more accurate assessment of the effects of MRI in this population can be made.

In addition to the recommendations by Teitelbaum and Oliver above, we emphasize that metallic fragments in the spinal canals of paralyzed patients represent only a *relative* contraindication to MRI.

## REFERENCES

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5/9/3

DIALOG(R)File 73:EMBASE

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07540003 EMBASE No: 1999027696

Rivet-like titanium clamp **implants** for fixation of skull flaps -  
Radiological identification, safety and image quality in MRINIETENARTIGE TITAN-KLAMMERN ZUR REFIXIERUNG VON KNOCHENDECKELN NACH  
KRANIOTOMIE - RADIOLOGISCHE IDENTIFIZIERUNG, ANWENDUNGSSICHERHEIT UND  
BILDQUALITÄT BEI CT- UND MR-UNTERSUCHUNGEN

Lerch K.D.; Morgenstern F.; Lau K.T.; Hoffmann G.

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RoFo Fortschritte auf dem Gebiete der Rontgenstrahlen und der Neuen

Bildgebenden Verfahren ( ROFO FORTSCHR. GEB. RONTGENSTR. NEUEN

BILDGEBENDEN VERFAHREN ) (Germany) 1998, 169/6 (601-604)

CODEN: RFGVE ISSN: 0936-6652

DOCUMENT TYPE: Journal; Article

LANGUAGE: GERMAN SUMMARY LANGUAGE: ENGLISH; GERMAN

NUMBER OF REFERENCES: 20

Purpose: The MRI and CT compatibility of a new design of metallic fixation **implants** for cranial bone flaps was investigated experimentally and following clinical application in craniotomy patients. Is imaging quality impaired through **implant**-induced artifacts? Methods: Possible induced movement and heating of the clamp **implant** as well as the magnitude of susceptibility artifacts were assessed experimentally by MRI at 1.5T. Additionally, **implant**-induced artifacts were evaluated under clinical conditions for all relevant MRI-sequences in 100 craniotomy patients whose skull flaps were re-affixed using the new clamp **implant**. Results: In T1f 1- weighted **spin echo** and fast **spin echo** sequences the sizes of **implant**-induced artifacts were equal to the size of the **implant** or slightly larger; in T1f 2- weighted **gradient echo** images artifacts were maximally double the size of the **implant** itself. Induced movement or heating was not observed. Conclusions: The safety in radiological imaging of titanium clamp **implants** for fixation of craniotomy bone flaps was established experimentally as well as under clinical conditions. The clamps can be easily identified by radiological imaging, cause no hazards to the patients, and have little effect on image quality.

## DRUG DESCRIPTORS:

\*titanium

## MEDICAL DESCRIPTORS:

\*nuclear magnetic resonance **imaging**; \***implant**; \*craniotomy  
image quality; computer assisted tomography; skull; artifact; human;  
article; priority journal

6/9/4 (Item 4 from file: 34)  
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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01898932 Genuine Article#: JJ866 Number of References: 22  
Title: WALLSTENT METALLIC BILIARY ENDOPROSTHESIS - MR IMAGING

CHARACTERISTICS

Author(s): GIRARD MJ; HAHN PF; SAINI S; DAWSON SL; GOLDBERG MA; MUELLER PR  
Corporate Source: MASSACHUSETTS GEN HOSP,DEPT RADIOLOG,32 FRUIT  
ST/BOSTON//MA/02114; MASSACHUSETTS GEN HOSP,DEPT RADIOLOG,32 FRUIT  
ST/BOSTON//MA/02114; HARVARD UNIV,SCH MED/BOSTON//MA/02115  
Journal: RADIOLOGY, 1992, V184, N3 (SEP), P874-876  
ISSN: 0033-8419

Language: ENGLISH Document Type: NOTE

Geographic Location: USA

Subfile: SciSearch; CC LIFE--Current Contents, Life Sciences; CC CLIN--  
Current Contents, Clinical Medicine

Journal Subject Category: RADIOLOGY & NUCLEAR MEDICINE

Abstract: Image quality and safety of magnetic resonance (

MR) imaging were evaluated in vitro and in eight patients with  
the most commonly employed metallic biliary endoprosthesis. In vitro,  
the stent produced no tip deflection at 0.6 or 1.5 T. Trace magnetic  
susceptibility artifact, similar to artifact from a column of air,  
paralleled the stent. In patients, image degradation was minimal with  
conventional pulse sequences. Middle-field-strength spin-  
echo images revealed minimal artifacts indistinguishable from  
those produced by pneumobilia.

Descriptors--Author Keywords: BILE DUCTS, MR ; BILE DUCTS, PROSTHESES  
; MAGNETIC RESONANCE (MR), ARTIFACT ; MAGNETIC  
RESONANCE (MR), SAFETY

Identifiers--KeyWords Plus: POTENTIAL HAZARDS; STENTS; IMPLANTS;

6/9/2 (Item 2 from file: 34)  
 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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08944886 Genuine Article#: 348BT Number of References: 40  
 Title: Coronary arterial stents: Safety and artifacts during MR  
 imaging  
 Author(s): Hug J (REPRINT) ; Nagel E; Bornstedt A; Schnackenburg B; Oswald  
 H; Fleck E  
 Corporate Source: HUMBOLDT UNIV, CHARITE, DEPT INTERNAL MED & CARDIOL,  
 AUGUSTENBURGER PL 1, CAMPUS VIRCHOW K/D-13353 BERLIN//GERMANY/  
 (REPRINT); PHILIPS MED SYST, /HAMBURG//GERMANY/  
 Journal: RADIOLOGY, 2000, V216, N3 (SEP), P781-787  
 ISSN: 0033-8419 Publication date: 20000900  
 Publisher: RADIOLOGICAL SOC NORTH AMER, 20TH AND NORTHAMPTON STS, EASTON,  
 PA 18042  
 Language: English Document Type: ARTICLE  
 Geographic Location: GERMANY  
 Subfile: CC LIFE--Current Contents, Life Sciences; CC CLIN--Current  
 Contents, Clinical Medicine  
 Journal Subject Category: RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING  
 Abstract: PURPOSE: To investigate the safety and imaging artifacts with  
 different coronary arterial stents and **magnetic resonance (**  
**MR)** imaging sequences.  
 MATERIALS AND METHODS: The heating, artifacts, and ferromagnetism  
 with different stents were studied with a 1.5-T **MR** tomograph with  
 ultrafast gradients by using turbo **spin-echo**, turbo  
**gradient-echo**, and echo-planar imaging sequences. Nineteen  
 stents, which were 8-25 mm in length and 3.0-4.5 mm in diameter, were  
 evaluated. Stent deviation induced by the magnetic field and during  
**MR** imaging, migration, and heating caused by the radio-frequency  
 pulses were examined. The size of imaging artifacts was measured with  
 all the stents under standardized conditions and with six stents after  
 their implantation into the coronary arteries of freshly explanted pig  
 hearts.  
 RESULTS: All except two types of stents showed minimal  
 ferromagnetism. No device migration or heating was induced. Turbo  
**spin-echo** images had minimal artifacts; larger artifacts  
 were seen on the turbo **gradient-echo** and echo-planar  
 images. With ultrafast gradients, the artifacts on the echo-planar  
 images were substantially reduced.  
 CONCLUSION: The studied coronary stents were not influenced by  
 heating or motion during 1.5-T **MR** imaging. Artifact size differed  
 according to the type and size of the stent and the **MR** imaging  
 sequence used. Thus, patients with these stents can be safely examined.  
 Descriptors--Author Keywords: coronary vessels, **MR** ; coronary  
 vessels, stents and prostheses ; **magnetic resonance (**  
**MR)**, artifact ; **magnetic resonance (MR)**, rapid  
 imaging ; **magnetic resonance (MR)**, safety

6/9/1 (Item 1 from file: 34)  
 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
 (c) 2003 Inst for Sci Info. All rts. reserv.

09864778 Genuine Article#: 457LZ Number of References: 22  
 Title: In vitro investigation of prosthetic heart valves in **magnetic resonance** imaging: Evaluation of potential hazards  
 Author(s): Pruefer D (REPRINT) ; Kalden P; Schreiber W; Dahm M; Buerke M; Thelen M; Oelert H  
 Corporate Source: Univ Mainz, Dept Cardiothorac & Vasc Surg, Langenbeck Str 1/D-55101 Mainz//Germany/ (REPRINT); Univ Mainz, Dept Cardiothorac & Vasc Surg, D-55101 Mainz//Germany/; Univ Mainz, Dept Radiol, D-55101 Mainz//Germany/; Univ Mainz, Dept Med Cardiol 2, D-55101 Mainz//Germany/  
 Journal: JOURNAL OF HEART VALVE DISEASE, 2001, V10, N3 (MAY), P410-414  
 ISSN: 0966-8519 Publication date: 20010500  
 Publisher: I C R PUBLISHERS, CRISPIN HOUSE, 12/A SOUTH APPROACH, MOOR PARK, NORTHWOOD, ENGLAND HA6 2ET  
 Language: English Document Type: ARTICLE  
 Geographic Location: Germany  
 Journal Subject Category: CARDIAC & CARDIOVASCULAR SYSTEMS

Abstract: Background and aim of the study: **Magnetic resonance (MR)** imaging is used in an increasing number of patients, and not only after cardiac valve replacement. However, ferromagnetic biomedical implants are often considered a contraindication for **MR** imaging because of the potential hazards with respect to their movement, dislodgement, or heating effects during the procedure. The purpose of this study was to assess ferromagnetism, attraction forces, heating effects, and artifacts associated with prosthetic heart valve implants.

Methods: Seventeen common heart valve prostheses (12 mechanical, five biological) were examined in vitro using a high-field-strength 1.5 Tesla (T) **MR** system. Attractive forces, temperature changes and the amount of artifacts were assessed by applying turbo-spin and **gradient-echo** sequences.

Results: The maximal calculated corresponding ferromagnetic force was  $(0.22 \times 10^{-3})$  N in the static magnetic field. The temperature changes ranged from 0 to 0.5 degreesC maximum. Artifacts produced by the presence of the heart valve prostheses were less evident using a **spin-echo** sequence than a **gradient-echo** sequence.

Conclusion: **MR** imaging exerted no significant force on the examined heart valve prostheses, and did not result in significant biological relevant temperature increase. None of the associated artifacts is considered to pose a substantial risk on **MR** imaging. **MR** procedures performed with a 1.5 T **MR** system can be applied safely in patients with heart valve prostheses evaluated in this study.

Identifiers--Keyword Plus(R): EX-VIVO EVALUATION; 1.5-T **MR** SYSTEM; METALLIC IMPLANTS; ARTIFACTS; SAFETY; FERROMAGNETISM; DEVICES

5/9/4  
 DIALOG(R)File 73:EMBASE  
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07413166 EMBASE No: 1998318896

A comparison of magnetic resonance and computed tomographic image quality after the implantation of tantalum and titanium spinal instrumentation

Wang J.C.; Yu W.D.; Sandhu H.S.; Tam V.; Delamarter R.B.

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Spine ( SPINE ) (United States) 01 AUG 1998, 23/15 (1684-1688)

CODEN: SPIND ISSN: 0362-2436

DOCUMENT TYPE: Journal; Article

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

NUMBER OF REFERENCES: 27

**Study Design.** Tantalum- and titanium-based lumbar interbody fusion devices were **implanted** into two fresh human cadavers, and magnetic resonance and computed tomographic imaging were performed to evaluate adjacent spinal structures and the amount of metallic artifact. **Objective.** The objective of this study was to p respectively compare the preliminary results of magnetic resonance imaging and computed tomography scanning image quality after the implantation of both titanium and tantalum spinal **implants**. **Summary of Background Data.** The availability of tantalum and titanium spinal **implants** brings theoretical magnetic resonance imaging compatibility along with several other desirable characteristics. The magnetic resonance imaging and computed tomographic imaging of tantalum spinal instrumentation has never been studied previously or compared with titanium instrumentation. **Methods.** Titanium and tantalum spinal **implants** produced for anterior spinal fusion were each placed at two levels in the lumbar spine of two fresh cadaver specimens. **Sequential spin echo** T1-weighted and T2-weighted magnetic resonance imaging studies and computed tomographic scans were obtained. The resulting images were then graded to describe and compare the behavior of tantalum metal in magnetic resonance imaging and computed tomographic studies. **Results.** Good T1 and T2 images were obtained that allowed visualization of the neural structures with minimal artifact. The optimal T1 images for tantalum metal were similar in quality to the optimal T1 parameters for titanium metal. T2 images for both tantalum and titanium metal were obtained with similar results for both metals. **Gradient-echo** magnetic resonance imaging scans of both were poorly imaged with a large amount of artifact. Computed tomographic studies of tantalum **implants** produced a large amount of metal artifact when compared with computed tomographic studies of titanium **implants**. **Conclusions.** High-quality magnetic resonance imaging studies can be obtained after the implantation of both titanium and tantalum spinal instrumentation. Both of the metals produce similar images on magnetic resonance imaging studies with comparable amounts of metallic artifact. High- quality computed tomographic scans of titanium **implants** can be obtained with minimal distortion secondary to artifact. However, computed tomographic scanning is not the imaging modality of choice for the tantalum spinal **implants** because of the large amounts of artifact.

63/9/1

DIALOG(R) File 155:MEDLINE(R)

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10922907 97275077 PMID: 9128971

Evaluation of permanent I-125 prostate implants using radiography and magnetic resonance imaging.

Moerland M A; Wijrdeman H K; Beersma R; Bakker C J; Battermann J J

Department of Radiotherapy, University Hospital Utrecht, The Netherlands.

International journal of radiation oncology, biology, physics (UNITED STATES) Mar 1 1997; 37 (4) p927-33, ISSN 0360-3016 Journal Code: 7603616

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Subfile: INDEX MEDICUS

**PURPOSE:** The aim of this study is the evaluation of permanent I-125 prostate implants using radiography and magnetic resonance imaging (MRI). **METHODS AND MATERIALS:** Twenty-one patients underwent radiography on the simulator and MRI within 3 days after implantation of the I-125 seeds. Isocentric radiographs were used for reconstruction of the seed distribution, after which registration with the seed-induced signal voids on MRI provided the seed positions in relation to the prostate. The prostate was contoured on the transversal magnetic resonance images, and dose-volume histograms were computed to evaluate the implants. The validity of the ellipsoidal prostate volume approximation, as applied in preimplant dose calculation, was assessed by comparison of ellipsoidal volumes given by prostate width, height, and length and prostate volumes obtained by a slice-by-slice contouring method, both on postimplant MRI. Prostate volume changes due to postimplant prostate swelling were assessed from radiographs taken at 3 days and 1 month after the implantation. **RESULTS:** The seeds were readily identified on T1-weighted spin-echo images and matched with the seed distribution reconstructed from the isocentric radiographs. The matching error, averaged over 21 patients, amounted to  $1.8 \pm 0.4$  mm (mean  $\pm$  standard deviation). The fractions of the prostate volumes receiving the prescribed matched peripheral dose (MPD) ranged from 32 to 71% (mean  $\pm$  standard deviation:  $60 \pm 10\%$ ). Prostate volumes, obtained by the contouring method on postimplant MRI, were a factor  $1.5 \pm 0.3$  larger than the ellipsoidal volumes given by the prostate dimensions on postimplant MRI. Prostate volumes 3 days after the implantation were a factor  $1.3 \pm 0.2$  larger than the prostate volumes 1 month after the implantation. Registration of the reconstructed seed distribution and the MR images showed inaccuracies in seed placement, for example, two or more seeds clustering together or seeds outside the prostate. **CONCLUSIONS:** Registration of the reconstructed seed distribution and the MR images enabled evaluation of target coverage, which amounted to  $60 \pm 10\%$ . The discrepancy between prescribed dose and realized dose was caused by underestimation of the preimplant prostate volume due to the ellipsoidal approximation, postimplant prostate swelling at the time of evaluation, and inaccuracies in seed placement.

Tags: Human; Male

Descriptors: Brachytherapy--instrumentation--IS; \*Iodine Radioisotopes; \*Prostate; \*Prostatic Neoplasms--radiotherapy--RT; Magnetic Resonance Imaging; Prostate--pathology--PA; Prostate--radiography--RA; Prostatic Neoplasms--pathology--PA; Prostatic Neoplasms--radiography--RA

*Requested from STIC*  
*March 1st 2003*



5/9/3 (Item 3 from file: 34)  
 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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10204590 Genuine Article#: 496KY Number of References: 17  
 Title: CT and MRI derived source localization error in a custom prostate phantom using automated image coregistration  
 Author(s): Dubois DF (REPRINT) ; Bice WS; Prestige BR  
 Corporate Source: Keesler Med Ctr,Radiat Oncol Serv,Keesler AFB/Biloxi//MS/39531 (REPRINT); Keesler Med Ctr,Radiat Oncol Serv,Biloxi//MS/39531; Univ Texas,Hlth Sci Ctr, Dept Radiol Sci,San Antonio//TX; Canc Therapy & Res Ctr S Texas,San Antonio//TX/78229  
 Journal: MEDICAL PHYSICS, 2001, V28, N11 (NOV), P2280-2284  
 ISSN: 0094-2405 Publication date: 20011100  
 Publisher: AMER INST PHYSICS, CIRCULATION & FULFILLMENT DIV, 2 HUNTINGTON QUADRANGLE, STE 1 N O 1, MELVILLE, NY 11747-4501 USA  
 Language: English Document Type: ARTICLE  
 Geographic Location: USA  
 Journal Subject Category: RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING  
 Abstract: Dosimetric evaluation of completed brachytherapy implant procedures is crucial in developing proper technique. Additionally, accurate dosimetry may be useful in predicting the success of an implant. Accurate definition of the prostate gland and localization of the implanted radioactive sources are critical to attain meaningful dosimetric data. MRI is recognized as a superior imaging modality in delineating the prostate gland. More importantly, MRI can be used for source localization in postimplant prostates. However, the MRI derived source localization error bears further investigation. We present a useful tool in determining the source localization error as well as permitting the fusion, or coregistration, of selected data from multiple imaging modalities. We constructed a custom prostate phantom of hydrocolloid material precisely implanted with 1-125 seeds. We obtained CT, the accepted modality, and MRI scans of the phantom. Subsequently, we developed an automated algorithm that employs a sequential translation of data sets to initially maximize coregistration and minimize error between data sets. This was followed by a noniterative solution for the necessary rotation transformation matrix using the Orthogonal Procrustes Solution. We applied this algorithm to CT and MRI scans of the custom phantom. CT derived source locations had source localization errors of 1.59 mm +/- 0.64. MRI derived source locations produced similar results (1.67 mm +/- 0.76). These errors may be attributed to the image digitization process. (C) 2001 American Association of Physicists in Medicine.

Descriptors--Author Keywords: brachytherapy reconstruction ; brachytherapy dosimetry ; image fusion ; image registration

Identifiers--KeyWord Plus(R): DOSE SPECIFICATION; BRACHYTHERAPY; IMPLANTS; VOLUMES

#### Cited References:

AMOLS HI, 1981, V8, P210, MED PHYS  
 BICE WS, 1997, V13, P297, J BRACHYTHER INT  
 BICE WS, 1999, V26, P1919, MED PHYS  
 DUBOIS D, 1996, V23, P1547, MED PHYS  
 DUBOIS DF, 1998, V207, P785, RADIOLOGY  
 DUBOIS DF, 1997, V39, P1037, INT J RADIAT ONCOL  
 KOUTROUVELIS PG, 1998, V159, P142, J UROLOGY  
 MOERLAND MA, 1997, V37, P927, INT J RADIAT ONCOL

\* Request from STIC  
 July 30<sup>th</sup> 2003

5/9/4 (Item 4 from file: 34)  
 DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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09267987 Genuine Article#: 386RA Number of References: 20  
 Title: The combined use of the natural and the cumulative dose-volume histograms in planning and evaluation of permanent prostatic seed implants  
 Author(s): Moerland MA (REPRINT) ; van der Laarse R; Luthmann RW; Wijrdeman HK; Battermann JJ  
 Corporate Source: Univ Med Ctr Utrecht, Dept Radiat Oncol, POB 85-500/NL-3508 GA Utrecht//Netherlands/ (REPRINT); Univ Med Ctr Utrecht, Dept Radiat Oncol, NL-3508 GA Utrecht//Netherlands/  
 Journal: RADIOTHERAPY AND ONCOLOGY, 2000, V57, N3 (DEC), P279-284  
 ISSN: 0167-8140 Publication date: 20001200  
 Publisher: ELSEVIER SCI IRELAND LTD, CUSTOMER RELATIONS MANAGER, BAY 15, SHANNON INDUSTRIAL ESTATE CO, CLARE, IRELAND  
 Language: English Document Type: ARTICLE  
 Geographic Location: Netherlands  
 Journal Subject Category: ONCOLOGY; RADIOLOGY, NUCLEAR MEDICINE & MEDICAL IMAGING  
 Abstract: Background and purpose: To investigate prostate dose coverage and overdosage in planned and realized permanent iodine seed prostate implants and to explore the use of the natural dose-volume histogram (NDVH) and the cumulative dose-volume histogram (CDVH) as tools to optimize prostate implants.

Materials and methods: The optimal prescription dose (PD) or natural prescription dose (NPD) was derived from the NDVH. The mismatch between the NPD and the given PD was called the natural dose ratio (NDR). For an ideal implant the NDR should be 1. The target is overdosed if  $NDR > 1$  and underdosed if  $NDR < 1$ . The NDR and prostate coverage were evaluated in implants of nine patients. Prostate coverage was determined from the CDVH based on pre-implant ultrasound or post-implant MRI for the planned and realized implants, respectively. The use of the NDVH to further optimize the planned prostate implants was also explored.

Results: The mean values of the NDRs were  $1.30 \pm 0.34$  (range 0.76-1.79),  $1.22 \pm 0.31$  (0.76-1.74) and  $1.22 \pm 0.12$  (0.98-1.33) for the planned, realized and optimized seed distributions, respectively. The realized prostatic implants showed smaller prostate coverage than the planned implants. The prostate volume fractions receiving 100% of the prescription dose were  $V_{100} = 79 \pm 6\%$  and  $V_{100} = 97 \pm 3\%$  for the realized and the planned implants, respectively.

Conclusions: The NDVH and the CDVH proved to be valuable tools in plan evaluation. The NDVH and its derived parameter NDR quantify the risk of under or overdosage for a given PD. The CDVH is valuable in evaluation of prostate coverage realized prostate. Our strategy to implant just the prostate and not the prostate plus a margin led to NDR values between 1.1 and 1.3 and a prostate coverage of  $V_{100} = 79 \pm 6\%$  in the nine patients. The planned coverage of  $V_{100} = 95\%$  was not realized, mainly due to inadequate coverage of the base of the prostate. (C) 2000 Elsevier Science Ireland Ltd. All rights reserved.  
 Descriptors--Author Keywords: natural dose-volume histogram ; cumulative dose-volume histogram ; brachytherapy ; prostate cancer  
 Identifiers--KeyWord Plus(R): RADIATION-THERAPY; BRACHYTHERAPY; CANCER; DOSIMETRY; RECOMMENDATIONS; OPTIMIZATION

#### Cited References:

ANDERSON LL, 1986, V13, P898, MED PHYS  
 ANDERSON LL, 1976, V3, P48, MED PHYS  
 BAGSHAW MA, 1995, V32, P541, INT J RADIAT ONCOL  
 BATTERMANN JJ, 1998, V14, P21, J BRACHYTHER INT  
 DAMICO AV, 1996, V14, P304, J CLIN ONCOL  
 DUBOIS DF, 1997, V39, P1037, INT J RADIAT ONCOL  
 FEYGELMAN V, 1995, V22, P97, MED PHYS

NA  
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 July 30<sup>th</sup> 2003

69/9/3

DIALOG(R) File 155:MEDLINE(R)

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08361345 95049317 PMID: 7960630

Characteristics of magnetic resonance sequences used for imaging silicone gel, saline, and gel-saline implants at low field strengths.

Frankel S; Occhipinti K; Kaufman L; Kramer D; Carlson J; Mineyev M; Friedenthal R

Department of Radiology, University of California, San Francisco.

Investigative radiology (UNITED STATES) Aug 1994, 29 (8) p781-6,  
ISSN 0020-9996 Journal Code: 0045377

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Subfile: INDEX MEDICUS

**RATIONALE AND OBJECTIVES.** Low-field magnetic resonance imaging (MRI) evaluation of breast implants is described, with emphasis on the capabilities provided by different imaging sequences. **METHODS.** Open architecture MR images using a .064-T permanent magnet and three-dimensional Fourier transform and inversion recovery sequences were obtained. A breast coil was designed and built for this project. Symptomatic and asymptomatic patients with silicone, saline-silicone and saline implants, and phantoms were part of this study. **Phase** images were used to differentiate protons in silicone, water, and fat. **RESULTS AND CONCLUSIONS.** Low-field MRI permitted differentiation of silicone, water, and fat. Implant anatomy and surrounding pathology could be imaged and identified.

Tags: Case Report; Female; Human; Support, Non-U.S. Gov't

Descriptors: Breast Implants; \*Magnetic Resonance

**Imaging**--methods--MT; Adult; Breast--pathology--PA; Breast Diseases  
--diagnosis--DI; Breast Diseases--etiology--ET; Breast Implants--adverse  
effects--AE; Gels; Middle Age; Models; Structural; Silicones; Sodium  
Chloride

*Deprate*

*Leavesbl from STIC  
July 30 2003*

51/3,AB,DE/3

DIALOG(R)File 155:MEDLINE(R)

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14552884 22314434 PMID: 12427641

**MR imaging**-related heating of deep brain stimulation electrodes: in vitro study.

Finelli Daniel A; Rezai Ali R; Ruggieri Paul M; Tkach Jean A; Nyenhuis John A; Hrdlicka Greg; Sharan Ashwini; Gonzalez-Martinez Jorge; Stypulkowski Paul H; Shellock Frank G

Division of Radiology, Section of Stereotactic and Functional Neurosurgery, The Cleveland Clinic Foundation, Cleveland, OH 44195, USA.

AJNR. American journal of neuroradiology (United States) Nov-Dec 2002, 23 (10) p1795-802, ISSN 0195-6108 Journal Code: 8003708

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**BACKGROUND AND PURPOSE:** Recent work has shown a potential for excessive heating of deep brain stimulation electrodes during **MR imaging**.

This in vitro study investigates the relationship between electrode heating and the specific absorption rate (SAR) of several **MR images**.

**METHODS:** In vitro testing was performed by using a 1.5-T **MR imaging** system and a head transmit-receive coil, with bilateral deep brain stimulation systems positioned in a gel saline-filled phantom, and temperature monitoring with a fluoro-optic thermometry system. Standardized fast **spin-echo** sequences were performed over a range of high, medium, and low SAR values. Several additional, clinically important **MR imaging** techniques, including 3D magnetization prepared rapid acquisition **gradient-echo** imaging, echo-planar imaging, quantitative magnetization transfer imaging, and magnetization transfer-suppressed MR angiography, were also tested by using typical parameters. **RESULTS:** A significant, highly linear relationship between SAR and electrode heating was found, with the temperature elevation being approximately 0.9 times the local SAR value. Minor temperature elevations, <1 degrees C, were found with the fast **spin-echo**, magnetization prepared rapid acquisition **gradient-echo**, and echo-planar clinical imaging sequences. The high dB/dt echo-planar imaging sequence had no significant heating independent of SAR considerations. Sequences with magnetization transfer pulses produced temperature elevations in the 1.0 to 2.0 degrees C range, which was less than theoretically predicted for the relatively high SAR values. **CONCLUSION:** A potential exists for excessive **MR imaging**-related heating in patients with deep brain stimulation electrodes; however, the temperature increases are linearly related to SAR values. Clinical imaging sequences that are associated with tolerable temperature elevations in the <or=2.0 degrees C range at the electrode tips can be performed safely within an SAR range <2.4 W/kg local (0.9 W/kg whole body averaged).

Descriptors: Brain--radiography--RA; \*Echo-Planar Imaging; \*Heating--instrumentation--IS; Body Temperature--physiology--PH; Electric Stimulation--instrumentation--IS; Electrodes, Implanted; Linear Models; Predictive Value of Tests

51/3,AB,DE/4  
 DIALOG(R)File 155:MEDLINE(R)  
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11825072 99264999 PMID: 10332595

T-1 weighted sequences for hepatic MRI: re-evaluation using a phased array coil.

Decorato D R; Rofsky N M; Earls J P; Krinsky G A; Weinreb J C  
 Department of Radiology, New York University Medical Center, NY 10016, USA.

Clinical imaging (UNITED STATES) Jan-Feb 1999, 23 (1) p26-31, ISSN 0899-7071 Journal Code: 8911831

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The purpose of this study was to compare three T1-weighted sequences for hepatic magnetic resonance (MRI) imaging with the use of a body phased array coil. Three different T1-weighted MR sequences were compared: a conventional spin echo (CSE);

half-Fourier spin echo (HFSE), and a gradient recalled echo (GRE). Three independent reviewers compared the sequences both quantitatively and qualitatively. The T1-weighted GRE sequence scored highest for overall image quality ( $p < 0.001$ ), lesion conspicuity ( $p = 0.012$ ), and yielded the highest contrast to noise (C/N) values. GRE T1-weighted images are the best for hepatic MRI.

Descriptors: \*Liver--pathology--PA; \*Magnetic Resonance Imaging--methods--MT; Adult; Aged; Aged, 80 and over; Liver Diseases--pathology--PA; Middle Age

51/3,AB,DE/5  
 DIALOG(R)File 155:MEDLINE(R)  
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11693345 99129073 PMID: 9930212

[Rivet-like titanium clamps for refixation of bone covers after craniotomy--radiologic identification, safety and image quality in CT and MR studies]

Nietenartige Titan-Klammern zur Refixierung von Knochendeckeln nach Kraniotomie--Radiologische Identifizierung, Anwendungssicherheit und Bildqualität bei CT- und MR-Untersuchungen.

Lerch K D; Morgenstern F; Lau K T; Hoffmann G

Neurochirurgische Klinik der Stadtischen Kliniken Dortmund.

RoFo. Fortschritte auf dem Gebiete der Rontgenstrahlen und der neuen bildgebenden Verfahren (GERMANY) Dec 1998, 169 (6) p601-4, ISSN 1438-9029 Journal Code: 9112114

Document type: Journal Article ; English Abstract

Languages: GERMAN

Main Citation Owner: NLM

Record type: Completed

PURPOSE: The MRI and CT compatibility of a new design of metallic fixation implants for cranial bone flaps was investigated experimentally and following clinical application in craniotomy patients. Is imaging quality impaired through implant-induced artifacts?

METHODS: Possible induced movement and heating of the clamp implant as well as the magnitude of susceptibility artifacts were assessed experimentally by MRI at 1.5 T. Additionally, implant-induced artifacts were evaluated under clinical conditions for all relevant MRI-sequences in 100 craniotomy patients whose skull flaps were re-affixed using the new clamp implant. RESULTS: In T1-weighted spin echo and fast spin echo sequences the sizes of

implant-induced artifacts were equal to the size of the implant or slightly larger; in T2-weighted gradient echo images artifacts were maximally double the size of the implant itself. Induced movement or heating was not observed. CONCLUSIONS: The safety in radiological imaging of titanium clamp implants for fixation of

craniotomy bone flaps was established experimentally as well as under clinical conditions. The clamps can be easily identified by radiological imaging, cause no hazards to the patients, and have little effect on image quality.

Descriptors: Craniotomy; \*Magnetic Resonance Imaging;  
 \*Postoperative Complications--diagnosis--DI; \*Surgical Instruments;  
 \*Titanium; \*Tomography, X-Ray Computed; Artifacts; Equipment Safety;  
 Phantoms, Imaging

51/3,AB,DE/6

DIALOG(R)File 155:MEDLINE(R)

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11668758 99103837 PMID: 9888762

Cardiac pacemakers and **implantable** cardioverter defibrillators are unaffected by operation of an extremity **MR imaging** system.

Shellock F G; O'Neil M; Ivans V; Kelly D; O'Connor M; Toay L; Crues J V  
 Department of Radiology, University of Southern California, and Shellock  
 R & D Services, Inc., Los Angeles 90045, USA.

AJR. American journal of roentgenology (UNITED STATES) Jan 1999, 172  
 (1) p165-70, ISSN 0361-803X Journal Code: 7708173

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

OBJECTIVE: The objective of our investigation was to determine whether an **MR imaging** system designed to obtain images of the extremities affects the safety and functionality of pacemakers or that of **implantable** cardioverter defibrillators (ICDs). MATERIALS AND METHODS: Ex vivo experiments were conducted in which seven pacemakers and seven ICDs were exposed to a 0.2-T extremity **MR imaging** system. Magnetic field attraction was assessed at three **positions** relative to the **MR imaging** system. In addition, the devices were placed into a test apparatus that was oriented parallel and perpendicular relative to the **MR imaging** system while imaging was performed on a phantom using T1-weighted **spin-echo** and **gradient-echo** sequences. Various functional aspects of the pacemakers and ICDs were evaluated before, during (pacemakers only), and after **MR imaging**. RESULTS: Magnetic field attraction was relatively minor for all devices. The quality of the **MR images** was unaffected by the devices. Operation of this MR system did not alter any of the functional aspects of the pacemakers or ICDs evaluated in this study. CONCLUSION: According to these data and in consideration of how patients are **positioned** during examinations--that is, **positioned** so that the thorax (where the pacemaker or ICD and the corresponding leads are located) does not enter the magnet bore--the results suggest that it should be safe to perform **MR imaging** in patients with the pacemakers and ICDs evaluated in this study.

Descriptors: Defibrillators, **Implantable**; \*Magnetic Resonance Imaging; \*Pacemaker, Artificial; Arm; Magnetic Resonance Imaging--methods--MT; Magnetics; Phantoms, Imaging; Posture

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DIALOG(R)File 155:MEDLINE(R)

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11581156 99013193 PMID: 9798849

Minimizing artifacts caused by metallic **implants** at **MR imaging**: experimental and clinical studies.

Suh J S; Jeong E K; Shin K H; Cho J H; Na J B; Kim D H; Han C D  
 Department of Diagnostic Radiology, Yonsei University College of  
 Medicine, Research Institute of Radiological Science, Seoul, Korea.

AJR. American journal of roentgenology (UNITED STATES) Nov 1998, 171  
 (5) p1207-13, ISSN 0361-803X Journal Code: 7708173

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**OBJECTIVE:** The purpose of this study was to investigate the effect of metallic **implant** positioning on **MR imaging** artifacts, to determine the optimal imaging conditions for minimizing artifacts, and to show the usefulness of artifact-minimizing methods in imaging of the knee. **MATERIALS AND METHODS:** Using **MR images** of experimental phantoms (titanium alloy and stainless steel screws), we compared the magnitude of metal-induced artifacts for various **pulse sequences**, different imaging parameters for the fast spin-echo sequence, and different imaging parameters for several incremental angles between the long axis of the screw and the direction of the main magnetic field. In clinical **MR imaging** of knees with metallic **implants** (n = 19), we assessed geometric distortion of anatomic structures to compare the influence of different **pulse sequences** (n = 19), frequency-encoding directions (n = 7), and knee positions (n = 15). **RESULTS:** Titanium alloy screws consistently produced smaller artifacts than did stainless steel screws. In experimental MR studies, artifacts were reduced with fast spin-echo sequences, with a screw orientation as closely parallel to the main magnetic field as possible, and, particularly, with smaller voxels that correlated positively with artifact size ( $R^2 = .88$ ,  $p < .01$ ). In clinical MR studies, fast spin-echo **MR imaging** obscured articular structures less than did spin-echo imaging (8/19 patients). In particular, the anterior-posterior frequency-encoding direction (3/7 patients) and the flexion position of the knee (5/15 patients) were effective in reducing artifacts. **CONCLUSION:** MR artifacts can be minimized by optimally positioning in the magnet subjects with metallic **implants** and by choosing fast spin-echo sequences with an anterior-posterior frequency-encoding direction and the smallest voxel size.

Descriptors: Artifacts; \*Magnetic Resonance Imaging; \*Metals; \*Prostheses and Implants; Adult; Aged; Magnetic Resonance Imaging--methods--MT; Middle Age; Phantoms, Imaging; Stainless Steel; Titanium

51/3,AB,DE/8

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11458729 98341990 PMID: 9678850

Analysis of **MRI** images of a silicone elastomer under different axial loading conditions.

Abel E W; Wheeler K I; Chudek J A; Hunter G; Som F M

School of Biomedical Engineering, University of Dundee, UK.

Biomaterials (ENGLAND) Jan-Feb 1998, 19 (1-3) p55-60, ISSN

0142-9612 Journal Code: 8100316

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Silicone elastomers have been used as **implants** in orthopaedics for replacements of small joints such as the metacarpophalangeal joint. A series of experiments was conducted on axially tensioned silicone elastomer tendon spacer samples to determine whether there is a relationship between stress in the material and image **intensity**. With increasing load, reduced image **intensities** were observed using **spin echo**

(SE), **gradient echo** (GE) and **magnetic resonance imaging** (MRI) snapshot techniques. MR attenuation was accentuated in the GE experiment. The T1 and T2 snapshot images were dim and showed a low signal-to-noise ratio, so analysis was limited. Changes in magnetic susceptibility are suggested as the mechanism causing reduced image **intensity**, due to the more pronounced attenuation in the GE image. An alternative mechanism is the alteration of crystallinity during loading, whereby molecular realignment modifies nuclear relaxation. The

changes in spin lattice (T1) and spin spin (T2) relaxation times, which would support this, were not, however, satisfactorily demonstrated.

Descriptors: **Magnetic Resonance Imaging--methods--MT; \* Prostheses and Implants; \*Silicone Elastomers--chemistry--CH; Image Processing, Computer-Assisted--methods--MT; Magnetic Resonance Spectroscopy--methods--MT; Orthopedic Fixation Devices**

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DIALOG(R)File 155:MEDLINE(R)  
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11406845 98288568 PMID: 9626879

High resolution **MRI** of MCF7 human breast tumors: complemented use of iron oxide microspheres and Gd-DTPA.

Furman-Haran E; Margalit R; Grobgeld D; Degani H  
Department of Biological Regulation, Weizmann Institute of Science, Rehovot, Israel.

Journal of magnetic resonance imaging - JMRI (UNITED STATES) May-Jun 1998, 8 (3) p634-41, ISSN 1053-1807 Journal Code: 9105850

Contract/Grant No.: CA 42238; CA; NCI

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The differential capacity of iron oxide microspheres and of gadolinium-diethylenetriamine pentaacetic acid (Gd-DTPA) to serve as contrast agents that can map the microcirculation of MCF7 human breast cancer **implanted** in nude mice has been examined by high resolution **MRI**. Modulation of signal **intensity** in T2\*-weighted, **gradient-echo** images after iron oxide administration and the temporal signal enhancement after Gd-DTPA administration were monitored and analyzed at a spatial resolution of 98 x 98 x 500 microm and 195 x 390 x 1,000 microm, respectively. The pathophysiologic features revealed in the contrast-enhanced images were analyzed in reference to those obtained from the corresponding high resolution T2-weighted, **spin-echo** images and from histologic sections stained with hematoxylin and eosin and with an endothelial cell marker. The results showed that iron oxide microspheres can aid in the characterization of gross histopathologic features and in the assessment of the distribution of the microvasculature, whereas Gd-DTPA estimates the permeability of the microvessels to this agent and determines the cellularity (cell volume fraction) in the vicinity of the vessels.

Descriptors: Contrast Media; \*Gadolinium DTPA--diagnostic use--DU; \*Image Enhancement--instrumentation--IS; \*Iron--diagnostic use--DU; \***Magnetic Resonance Imaging--instrumentation--IS; \*Mammary Neoplasms, Experimental--diagnosis--DI; \*Oxides--diagnostic use--DU; Image Processing, Computer-Assisted--instrumentation--IS; Mammary Neoplasms, Experimental--blood supply--BS; Mice; Mice, Nude; Microcirculation--pathology--PA; Neoplasm Transplantation; Neovascularization, Pathologic--diagnosis--DI; Neovascularization, Pathologic--pathology--PA; Tumor Cells, Cultured**

51/3,AB,DE/10  
DIALOG(R)File 155:MEDLINE(R)  
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11386227 98267361 PMID: 9601974

Study of susceptibility-induced artefacts in GRASE with **different echo train** length.

Allkemper T; Reimer P; Schuierer G; Peters P E  
Institute of Clinical Radiology, Westfalian Wilhelms University Muenster, Albert-Schweitzer-Strasse 33, D-48 129 Muenster, Germany.

European radiology (GERMANY) 1998, 8 (5) p834-8, ISSN 0938-7994  
Journal Code: 9114774

Document type: Journal Article

Languages: ENGLISH



Main Citation Owner: NLM

Record type: Completed

The aim of this study was to evaluate the sensitivity of gradient-and-spin-echo (GRASE) sequences to susceptibility effects. GRASE sequences with 21 and 33 echoes per echo train were compared with a T2-weighted FSE sequence with an echo train length of 5 by means of MRI in phantoms, volunteers (n = 10), and patients (n = 19) with old hemorrhagic brain lesions. All experiments were performed on a 1.0-T clinical MR system (Impact Expert, Siemens AG, Erlangen, Germany) with constant imaging parameters. Contrast-to-noise ratios (CNRs) of tubes doped with iron oxides at different concentrations, of brain areas with physiological iron deposition (red nucleus, substantia nigra), and of areas of old brain hemorrhage were calculated for FSE and GRASE pulse sequences. Areas of old brain hemorrhage were also qualitatively analyzed for the degree of visible susceptibility effects by blinded reading. The CNR of iron oxide tubes and iron-containing brain areas decreased with increasing echo trains of GRASE sequences. The CNR of GRASE sequences decreased when compared with CNR of their FSE counterparts (GRASE 21 echo trains 23.8 +/- 0.8, FSE 5 echo trains 26.7 +/- 0.9; p <= 0.01). Qualitative analysis confirmed these measurements. FSE with an ETL of 5 demonstrated significantly stronger susceptibility effects than their GRASE counterpart with an ETL of 21. The results demonstrate that GRASE sequences do not necessarily compensate for the reduced sensitivity of FSE to susceptibility effects. The complex signal behavior of GRASE makes conventional SE, gradient echo, or FSE sequences containing shorter echo trains preferable when patients with intracranial hemorrhage are clinically evaluated.

Descriptors: \*Artifacts; \*Magnetic Resonance Imaging; Adult; Brain --anatomy and histology--AH; Cerebral Hemorrhage--diagnosis--DI; Ferric Compounds--diagnostic use--DU; Image Enhancement; Middle Age; Observer Variation; Reproducibility of Results; Sensitivity and Specificity

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DIALOG(R)File 155:MEDLINE(R)

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11357947 98238356 PMID: 9577495

Breast lesion localization: a freehand, interactive MR imaging-guided technique.

Daniel B L; Birdwell R L; Ikeda D M; Jeffrey S S; Black J W; Block W F; Sawyer-Glover A M; Glover G H; Herfkens R J  
Department of Radiology, Stanford University, Lucas MRS/I Center, CA 94305-5488, USA.

Radiology (UNITED STATES) May 1998, 207 (2) p455-63, ISSN 0033-8419  
Journal Code: 0401260

Contract/Grant No.: P41 RR09784; RR; NCRR; T32 09695-04; PHS

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

PURPOSE: To evaluate interactive magnetic resonance (MR) imaging-guided preoperative needle localization and hookwire placement in the noncompressed breast in patients in the prone position. MATERIALS AND METHODS: Nineteen MR imaging-guided breast lesion localization procedures were performed in 17 patients aged 38-70 years (mean age, 48 years) by using an open-platform breast coil in either a 1.5-T, closed-bore imager (n = 14) or a 0.5-T, open-bore imager (n = 5). Rapid imaging (fast spin-echo, water-selective fast spin-echo, or water-specific three-point Dixon gradient-echo) was alternated with freehand manipulation of an MR-compatible needle to achieve accurate needle placement. RESULTS: Up to three manipulations of the needle were required during an average of 9 minutes to reach the target lesion. MR imaging findings confirmed the final needle position within 9 mm of the target in all cases. The accuracy of 10 localizations was independently corroborated either at mammography or at ultrasonography. Nine lesions were visible on MR images only. CONCLUSION: Interactive MR imaging-guided,

freehand needle localization is simple, accurate, and requires no special stereotactic equipment. Lesions throughout the breast, including those in the anterior part of the breast and those near the chest wall, which can be inaccessible with standard grid or compression-plate techniques, can be localized. A variety of needle trajectories in addition to the horizontal path are possible, including circumareolar approaches and tangential needle paths designed to avoid puncture of **implants**.

Descriptors: Biopsy, Needle--methods--MT; \*Breast Neoplasms--diagnosis--DI; \*Magnetic Resonance Imaging; \*Radiology, Interventional; Adult; Aged; Biopsy, Needle--instrumentation--IS; Breast **Implants**; Breast Neoplasms--pathology--PA; Breast Neoplasms--radiography--RA; Breast Neoplasms--ultrasonography--US; Carcinoma in Situ--diagnosis--DI; Carcinoma in Situ--pathology--PA; Carcinoma, Infiltrating Duct--diagnosis--DI; Carcinoma, Infiltrating Duct--pathology--PA; Carcinoma, Lobular--diagnosis--DI; Carcinoma, Lobular--pathology--PA; Contrast Media; Dyes--diagnostic use--DU; Equipment Design; Evaluation Studies; Fibroadenoma--diagnosis--DI; Fibroadenoma--pathology--PA; Fibrocystic Disease of Breast--diagnosis--DI; Fibrocystic Disease of Breast--pathology--PA; Follow-Up Studies; Gadolinium--diagnostic use--DU; Heterocyclic Compounds--diagnostic use--DU; Image Enhancement; Image Processing, Computer-Assisted; **Magnetic Resonance Imaging** --instrumentation--IS; Mammography; Methylene Blue--diagnostic use--DU; Middle Age; Needles; Organometallic Compounds--diagnostic use--DU; Pressure; Prone Position; Stereotaxic Techniques; Thorax--pathology--PA; Ultrasonography, Mammary

51/3,AB,DE/12

DIALOG(R)File 155:MEDLINE(R)

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11331177 98210960 PMID: 9549791

Metallic artifacts in **magnetic resonance imaging** of patients with spinal fusion. A comparison of **implant** materials and imaging sequences.

Rudisch A; Kremser C; Peer S; Kathrein A; Judmaier W; Daniaux H

Department of Radiology, University Hospital of Innsbruck, Austria.

Spine (UNITED STATES) Mar 15 1998, 23 (6) p692-9, ISSN 0362-2436

Journal Code: 7610646

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

STUDY DESIGN: Devices for spinal fusion were compared with respect to their influence on magnetic resonance images. In addition, **different** magnetic resonance **pulse sequences** were evaluated to elicit their susceptibility to imaging artifacts. OBJECTIVES: To determine the **implants** with the least imaging artifacts as a recommendation for the spine surgeon and to assess the best imaging strategy for the radiologist. SUMMARY OF BACKGROUND DATA: For patients who have had surgical spinal fusion with instrumentation, **magnetic resonance imaging** is the most favorable diagnostic method. Unfortunately, metallic **implants** lead to severe degradation of image quality. These artifacts depend on the material of the **implant** and on the choice of the **pulse sequence**. METHODS: The fusion devices were mounted on a simple plastic phantom in various combinations and were imaged on 1.5-T magnetic resonance units. Frequently used types of plates and screws made of titanium or steel in various alloys were examined on the phantom with routinely used **pulse sequences**. The results of these examinations were compared with those in patient studies involving the same **implants** as well as the same **pulse sequences**. RESULTS: The least imaging artifacts were caused by titanium **implants**, especially when using shorter screws, wider screw placement, and thinner titanium plates. Nevertheless, there were distinct image distortions that could lead to erroneous image interpretation. The best images were acquired by spin echo (T1), turbo spin echo (T1, T2), and half Fourier single shot turbo spin echo (HASTE) sequences. Sequences containing any gradient echo

components (gradient echo or turbo gradient and spin echo sequence or frequency-selective fat saturation techniques) resulted in the highest amount of image degradation. **CONCLUSION:** By choosing appropriate spinal fusion devices as well as **pulse sequences**, postoperative **magnetic resonance imaging** examinations can give acceptable results, in spite of the presence of metallic implants.

Descriptors: **Magnetic Resonance Imaging; \* Prostheses and Implants; \*Spinal Fusion--instrumentation--IS; Adolescent; Adult; Aged; Alloys; Artifacts; Middle Age; Phantoms, Imaging; Titanium**

51/3,AB,DE/13  
DIALOG(R)File 155:MEDLINE(R)  
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11281331 98159908 PMID: 9500272

**MRI** monitoring of interstitial microwave-induced heating and thermal lesions in rabbit brain in vivo.

Moriarty J A; Chen J C; Purcell C M; Ang L C; Hinks R S; Peters R D; Henkelman R M; Plewes D B; Bronskill M J; Kucharczyk W

Department of Medical Imaging, University of Toronto, Ontario, Canada.

Journal of magnetic resonance imaging - JMRI (UNITED STATES) Jan-Feb 1998, 8 (1) p128-35, ISSN 1053-1807 Journal Code: 9105850

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The purpose of this experiment was to use **MRI** to monitor microwave heating and thermal damage of brain tissue in vivo. Interstitial microwave antennas were **implanted** into the cerebral hemispheres of seven anesthetized rabbits. Variable power of 30 to 100 W was applied for periods of 5 to 15 minutes and tissue temperature was monitored continuously. **MR images** were obtained throughout the procedure at 20-second intervals, using a spoiled **gradient-echo** sequence, without significant artifact. **Magnitude, phase, and complex** difference images all demonstrated temperature-related signal changes during heating. The findings were better visualized on the **phase** and **complex** difference images. **Phase** difference image analysis revealed an approximately linear relationship between **phase** change and temperature. Post-treatment thermal lesions measured up to 2.0 cm in size on pathologic specimens and exhibited a zonal pattern on **spin-echo MR images**.

Descriptors: Brain--pathology--PA; \*Hyperthermia, Induced--methods--MT; \***Magnetic Resonance Imaging--methods--MT; \*Microwaves** --therapeutic use--TU; Diathermy--instrumentation--IS; Rabbits

51/3,AB,DE/14  
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11208531 98085301 PMID: 9423314

Dynamic susceptibility contrast MRI with echo planar imaging using 1.0T system: comparison of **different EPI sequences**

Tsuchida C; Yamada H; Kumada H; Maeda M; Koshimoto Y; Kimura H; Kawamura Y; Okamoto J; Takizawa O; Ishii Y

Department of Radiology, Fukui Medical School.

Nippon Igaku Hoshasen Gakkai zasshi. Nippon acta radiologica (JAPAN) Nov 1997, 57 (13) p860-3, ISSN 0048-0428 Journal Code: 0413544

Document type: Journal Article ; English Abstract

Languages: JAPANESE

Main Citation Owner: NLM

Record type: Completed

Dynamic susceptibility contrast MRI has been performed using the **gradient echo** sequence on conventional MR imagers. On echo planar imaging (EPI) devices, not only **gradient-echo** EPI but

also **spin-echo** EPI allow for the monitoring of contrast agent-induced changes in susceptibility. The purpose of this study was to evaluate the contribution of each EPI pulse sequence to susceptibility-induced delta R2(\*) through the first pass of a bolus of Gd-DTPA. Thirty healthy volunteers were examined with a 1.0T superconducting MRI unit (IMPACT, Siemens) using EPI. For dynamic susceptibility contrast MRI, we used **gradient echo** EPI (TE = 60), **spin echo** EPI (TE = 60) and asymmetric **spin echo** EPI (TE = 88). Regional relative CBV (rrCBV) maps were generated. On the rrCBV map generated with **gradient echo** EPI, the high-intensity area of the brain surface was more conspicuous than that generated with **spin echo** EPI. The rrCBV map generated with asymmetric **spin echo** EPI represented the contrast between those generated with **spin echo** EPI and **gradient echo** EPI. The rrCBV rate between gray matter and white matter with **gradient echo** EPI was significantly higher than that with **spin echo** EPI. We suggest that the rrCBV map calculated with **spin echo** EPI tends to reflect capillary blood volume and the rrCBV map calculated with **gradient echo** EPI tends to reflect total blood volume.

Descriptors: \*Brain--pathology--PA; \*Cerebrovascular Circulation; \*Contrast Media; \*Echo-Planar Imaging--methods--MT; Adult; Middle Age; Perfusion

51/3,AB,DE/15

DIALOG(R)File 155:MEDLINE(R)

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11189665 98066209 PMID: 9402589

Effect of **implant** dose/volume and surgical resection on survival in a rat glioma brachytherapy model: implications for brain tumor therapy.

Bampoe J; Glen J; Mackenzie I; Porter P; Bernstein M

Division of Neurosurgery, Toronto Hospital, University of Toronto, Ontario, Canada.

Neurosurgery (UNITED STATES) Dec 1997, 41 (6) p1374-83; discussion 1383-4, ISSN 0148-396X Journal Code: 7802914

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

OBJECTIVE: This study sought to investigate the effects of **implant** dose/volume and surgical resection on survival in a rat glioma brachytherapy model. Two doses were investigated to determine a suitable therapeutic range. METHODS: We performed two experiments. Three treatment groups and one control group of male F-344 rats bearing 9L brain tumors 12 days after tumor inoculation were used in the first experiment. Day 12 tumors were an average of 4 to 6 mm in diameter. Animals treated with brachytherapy received a tumor dose of 80 Gy delivered to a 5.5-mm-radius volume. Total macroscopic tumor removal was achieved by microsurgical techniques. A subsequent experiment compared the survival of tumor-burdened rats treated with an **implant** dose of 60 Gy delivered to a 5.5-mm-radius volume with a control group. RESULTS: Surgery alone produced an increased life span of 28.6% over control animals treated with sham surgery and dummy **seed implants**, a statistically significant increase in survival (P = 0.0023, log-rank test). Brachytherapy alone produced the most significant increase in survival over control animals (P = 0.0001, log-rank test; median survival not attained with an **implant** dose of 80 Gy delivered to a 5.5-mm-radius volume; and P = 0.0001, increased life span 121% with an **implant** dose of 60 Gy delivered to a 5.5-mm-radius volume). This was not improved by the addition of surgical tumor removal. CONCLUSION: We have demonstrated a relationship between **implant** dose/volume and survival of tumor-burdened rats in this model that is not improved by the addition of tumor removal. Implications for brain tumor brachytherapy are discussed.

Descriptors: **Brachytherapy**; \*Brain Neoplasms--surgery--SU; \*Brain Neoplasms--therapy--TH; \*Glioma--surgery--SU; \*Glioma--therapy--TH; Brain

--pathology--PA; Brain Neoplasms--mortality--MO; Combined Modality Therapy;  
 Dose-Response Relationship, Radiation; Glioma--mortality--MO;  
**Magnetic Resonance Imaging**; Microsurgery; Neoplasm  
 Transplantation; Rats; Rats, Inbred F344; Survival Analysis

51/3,AB,DE/16

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11181328 98057731 PMID: 9395956

Usefulness of **magnetic resonance imaging** for managing  
 patients with prosthetic carbon valve in the mitral **position**  
 Koito H; Imai Y; Suzuki J; Ohkubo N; Nakamura C; Takahashi H; Iwasaka T;  
 Inada M

Second Department of Internal Medicine/Cardiovascular Center, Kansai  
 Medical University, Osaka.

Journal of cardiology (JAPAN) Nov 1997, 30 (5) p251-63, ISSN  
 0914-5087 Journal Code: 8804703

Document type: Journal Article ; English Abstract

Languages: JAPANESE

Main Citation Owner: NLM

Record type: Completed

The safety, findings and clinical usefulness of magnetic resonance (MR) **imaging** were assessed in patients with a prosthetic carbon valve in the mitral **position**. In vitro deflection, heating and image distortion due to the magnetic field of a 1.5 tesla MR machine were examined in three carbon valves (CarboMedics, St. Jude Medical and Bjork-Shiley valves). In vivo **MR imaging** of the left ventricular horizontal long-axis, vertical long-axis and short-axis views was performed by electrocardiographically synchronized **spin echo** and field (**gradient**) **echo** techniques in eight patients with prosthetic mitral carbon valves, consisting of six CarboMedics valves, one St. Jude Medical valve and one Bjork-Shiley valve. No deflection and significant heating was seen in all three valves in vitro. Although little image distortion was shown in the CarboMedics and St. Jude Medical valves, a small distortion toward the frequency encoded direction was seen in the Bjork-Shiley valve but caused no difficulty in assessing the surrounding images. Four of the eight patients had normal sinus rhythm and the other four had atrial fibrillation. The prosthetic valves were depicted as signal voids in the images taken by both **spin**

**echo** and **field echo** techniques in vivo. Clear structural information with little image distortion of the adjacent tissues of the prosthetic valves were obtained in all patients, although the image of the Bjork-Shiley valve which contained stainless steel in the frame had a slightly stronger distortion than those of the CarboMedics and St. Jude Medical valves which contained titanium. The stainless wire suture material used to close the sternal incision was depicted as a signal void, and the areas of the signal loss were larger in the images taken by the **field**

**echo** technique than those by the **spin echo** technique. The images taken by the **spin echo** technique in patients with atrial fibrillation had reduced quality due to the irregularity of repetition time. Cine **MR imaging** by the **field echo** technique showed physiological mitral regurgitant jets as signal loss within the flowing blood, which appeared as high signal **intensity**, bidirectionally in the bileaflet mechanical valve and unidirectionally in the monoleaflet mechanical valve. An abnormal cavity was seen behind the basal left ventricular myocardium in one patient with a CarboMedics valve. The wall of the abnormal cavity was disrupted abruptly and the rest of the wall consisted of pericardium and adjacent tissue in the image taken by the **spin echo** technique. The image taken by the **field**

**echo** technique showed an abnormal jet flow from the basal part of the left ventricular cavity into the abnormal cavity, which was compatible with left ventricular pseudoaneurysm. Two-dimensional echocardiography and Doppler color flow mapping disclosed the abnormal cavity and the abnormal flow inside, but failed to show the connection between the left ventricle and the cavity due to reverberation of the ultrasound signal by the

prosthetic valve. These findings suggest that **MR imaging** is a safe and promising method to assess the complications and valvular function in patients with a prosthetic carbon valve in the mitral position.

Descriptors: Heart Valve Prosthesis; \*Magnetic Resonance Imaging--methods--MT; \*Mitral Valve--pathology--PA; Aged; Carbon; Heart Valve Diseases--diagnosis--DI; Heart Valve Prosthesis Implantation; Middle Age

51/3,AB,DE/17  
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11067081 97421773 PMID: 9275890

**MR imaging** signal-intensity abnormalities after placement of arterial endoprostheses.

Muller-Hulsbeck S; Link J; Schwarzenberg H; Steffens J C; Brossmann J; Hulsbeck A; Heller M

Department of Radiology, University Hospital, Kiel, Germany.

AJR. American journal of roentgenology (UNITED STATES) Sep 1997, 169

(3) p743-8, ISSN 0361-803X Journal Code: 7708173

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**OBJECTIVE:** Our objectives were to describe changes in T2-weighted **MR images** of patients who had undergone **implantation** of an endoluminal stent-graft and determine the rate of early reocclusion in patients with abnormal MR findings. **SUBJECTS AND METHODS:** Twenty-nine patients with 26 occlusions (average length, 8.7 +/- 5.6 cm) and three dissections of the superficial femoral artery were treated with 45 endoluminal stent-grafts. T2-weighted **gradient-echo** and T2-weighted turbo **spin-echo MR images** were obtained for all patients at 48 hr and at 4 weeks after stent-graft placement. We reviewed the **MR imaging** studies to assess the extent and severity of tissue alteration at the site of stent-graft **implantation**. **RESULTS:** Technical success rate of stent-graft placement was 100%. Three signal-intensity patterns were seen on **MR images** obtained at 48 hr: normal signal intensity (n = 8), subtle perivascular signal-intensity abnormalities at the site of stent-graft **implantation** (n = 11), and extensive signal-intensity abnormalities from the adductor canal to the subcutis (n = 10). Twenty of 21 patients with abnormal signal intensity on **MR images** had fevers and pain at the **implantation** site. Clinical signs of deep vein thrombosis, a diagnosis excluded on the basis of phlebography, were seen in the 10 patients with extensive signal-intensity abnormalities. In two of these 10 patients, the superficial femoral artery reoccluded within 4 weeks of **implantation**. **MR images** obtained at 4 weeks showed no signal-intensity abnormalities in any of the 29 patients. **CONCLUSION:** MR findings of perivascular signal-intensity abnormalities after **implantation** of endoluminal stent-grafts are associated with clinical complications such as local pain and fever. Care should be taken to avoid confusing the clinical signs of the postimplantation syndrome at 48 hr with deep vein thrombosis.

Descriptors: Blood Vessel Prosthesis; \*Femoral Artery--surgery--SU; \*Magnetic Resonance Imaging; \*Stents; Aged; Angiography, Digital Subtraction; Arterial Occlusive Diseases--radiography--RA; Arterial Occlusive Diseases--surgery--SU; Femoral Artery--pathology--PA; Femoral Artery--radiography--RA; Graft Occlusion, Vascular--diagnosis--DI; Graft Occlusion, Vascular--radiography--RA; Middle Age; Recurrence

51/3,AB,DE/18  
DIALOG(R)File 155:MEDLINE(R)  
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10960999 97313651 PMID: 9170052

MRI acoustic noise: sound pressure and frequency analysis.  
 Counter S A; Olofsson A; Grahn H F; Borg E  
 Neurology Department, Harvard University Biological Laboratories,  
 Cambridge, MA 02138, USA.  
 Journal of magnetic resonance imaging - JMRI (UNITED STATES) May-Jun  
 1997, 7 (3) p606-11, ISSN 1053-1807 Journal Code: 9105850  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

The large gradient coils used in MRI generate, simultaneously with the pulsed radiofrequency (RF) wave, acoustic noise of high **intensity** that has raised concern regarding hearing safety. The sound pressure levels (SPLs) and power spectra of MRI acoustic noise were measured at the **position** of the human head in the isocenter of five MRI systems and with 10 **different pulse sequences** used in clinical MR scanning. Each protocol, including magnetization-prepared rapid **gradient echo** (MP-RAGE; 113 dB SPL linear), fast **gradient echo turbo** (114 dB SPL linear), and **spin echo** T1/2 mm (117 dB SPL linear), was found to have the high SPLs, rapid pulse rates, amplitude-modulated pulse envelopes, and multi-peaked spectra. Since thickness and SPL were inversely related, the T1-weighted images generated more intense acoustic noise than the proton-dense T2-weighted measures. The unfiltered linear peak values provided more accurate measurements of the SPL and spectral content of the MRI acoustic noise than the commonly used dB A-weighted scale, which filters out the predominant low frequency components. Fourier analysis revealed predominantly low frequency energy peaks ranging from .05 to approximately 1 kHz, with a steep high frequency cutoff for each **pulse sequence**. Ear protectors of known attenuation ratings are recommended for all patients during MRI testing.

Descriptors: \*Hearing Loss, Noise-Induced--etiology--ET; \*Magnetic Resonance Imaging--adverse effects--AE; Calibration; Child; Environmental Monitoring; Fourier Analysis; Infant; Magnetic Resonance Imaging --instrumentation--IS; Models, Theoretical; Phantoms, Imaging; Pressure; Risk Assessment

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10703464 97052734 PMID: 8897368  
 Use of a modified polysaccharide gel in developing a realistic breast phantom for **MRI**.

Mazzara G P; Briggs R W; Wu Z; Steinbach B G  
 Department of Radiology, University of Florida, Gainesville 32610, USA.  
 Magnetic resonance imaging (UNITED STATES) 1996, 14 (6) p639-48,  
 ISSN 0730-725X Journal Code: 8214883  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

A polysaccharide material, TX-151, has been used together with water, NaCl, and Al powder to create a tissue equivalent gel to make a realistic, inexpensive, conveniently moldable, temporally stable tissue equivalent **MRI** phantom. Various phantom compositions were studied for variations in gelling time and relaxation times. Gd-DTPA added as a T1 (and T2) modifier and aluminum powder added to decrease T2 permitted phantoms to be made with a range of relaxation times comparable to human tissues. We have used this polysaccharide gel to create breast phantoms for testing breast coils and evaluating **different MRI imaging sequences** available for diagnosis. The breast phantoms consisted of a layer of Crisco, a good model for adipose tissue, surrounding the TX-151 gel. Some of these phantoms were created with a silicone **implant** encapsulated in the gel to simulate an augmented breast. More sophisticated phantoms can easily be developed by additions of other materials to this polysaccharide gel.

Descriptors: **Magnetic Resonance Imaging**; \*Phantoms,  
Imaging; Gels; Polysaccharides

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10505300 96315896 PMID: 8688241

**MR imaging** in the presence of small circular metallic  
**implants**. Assessment of thermal injuries.

Manner I; Alanen A; Komu M; Savunen T; Kantonen I; Ekfors T  
Department of Diagnostic Radiology, University of Turku, Finland.  
Acta radiologica (Stockholm, Sweden - 1987) (DENMARK) Jul 1996, 37  
(4) p551-4, ISSN 0284-1851 Journal Code: 8706123

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**PURPOSE.** The thermal effects of **MR imaging** in the presence of  
circular nonferro-magnetic metallic **implants** were studied in 6  
rabbits. **MATERIAL AND METHODS.** A sternotomy was performed and **fixed**  
with stainless steel wires, and small titanium rings (diameter 3 mm) were  
placed on the surface of the ascending aorta and subcutaneous tissue of the  
thigh. Four of the rabbits were exposed to an imaging procedure with a 1.5  
T scanner applying a T1-weighted **spin-echo** sequence and a  
**gradient echo** sequence. Two of the animals served as unexposed  
controls. Thirty-six hours after the exposure, tissues adjacent to the  
**implants** were examined histologically and compared with corresponding  
samples of the control animals. **RESULTS.** In the area of the titanium rings,  
histologic analysis revealed slight inflammatory changes apparently caused  
by the operation. No evidence of thermal injury was found, suggesting that  
the presence of the rings does not contraindicate MR examinations. Necrosis  
was noted in all of the sternal specimens. This was probably  
post-operative, but it impaired the assessment of thermal injury in this  
area.

Descriptors: Burns--etiology--ET; \***Magnetic Resonance**  
**Imaging**--adverse effects--AE; \*Metals; \***Prostheses and Implants**  
; Aorta--injuries--IN; Rabbits; Stainless Steel; Sternum--injuries--IN;  
Thigh--injuries--IN; Titanium

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10396250 96201679 PMID: 8629252

Tirilazad does not protect rat brain from brachytherapy-induced injury.

**Bernstein M**; Cabantog A M; Glen J; Stiver S; Mikulis D

Brain Tumour Research Laboratory, Toronto Hospital, University of  
Toronto, Ontario, Canada.

Surgical neurology (UNITED STATES) May 1996, 45 (5) p482-9, ISSN  
0090-3019 Journal Code: 0367070

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**BACKGROUND:** Acute and chronic brain injury are common sequelae of  
high-dose focused radiation, as in radiosurgery and brachytherapy.  
Development of protectors of radiation injury, which would work in brain  
but not in tumor, would help enhance the therapeutic ratio of  
focused-radiation therapy. **METHODS:** Radiation protection by a clinically  
available 21-aminosteroid, Tirilazad, was studied in a rat brain  
brachytherapy model, both in tumor and non-tumor bearing animals. For the  
tumor model, 9L Glioma/SF line cells were **implanted** stereotactically  
into the right frontal lobe of F-344 rats and grew to a sphere of 5.0-mm  
diameter after 12 days. Animals received a standard brachytherapy dose of



80 Gy to a 5.5-mm radius volume administered by a high-activity removable iodine-125 seed. Radiation damage was evaluated 24 hours after removal of the seeds in all animals and again at 3 months in non-tumor-bearing animals, by T1-weighted gadolinium-enhanced and T2-weighted magnetic resonance imaging (MRI) on a 1.5-T unit. Treated animals received Tirilazad 5 mg/kg intravenously 15 minutes prior to implant, 1 hour after implant, every 6 hours for the duration of the implant, and for 24 hours after removal of the seed. Control animals were administered vehicle only. RESULTS: In both non-tumor-bearing and tumor-bearing rats, no difference in the volume of lesions on enhanced T1 or T2 MRI was seen between the Tirilazad-treated and control groups. In the non-tumor-bearing rats, volume of both T1 enhanced and T2 MRI lesions was significantly reduced at 3 months compared to the values at 24 hours. CONCLUSIONS: In the present model, Tirilazad failed to reduce the volume of radiation brain injury from brachytherapy as seen on MRI, studied acutely in tumor-bearing and non-tumor-bearing animals and also at 3 months in non-tumor-bearing rats.

Descriptors: Antioxidants--pharmacology--PD; \*Brachytherapy  
 --adverse effects--AE; \*Brain Injuries--etiology--ET; \*Pregnatrienes  
 --pharmacology--PD; Brain--drug effects--DE; Brain--radiation effects--RE;  
 Disease Models, Animal; Magnetic Resonance Imaging; Rats;  
 Rats, Inbred F344; Time Factors

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10391763 96197175 PMID: 8615272

Optimizing imaging parameters for MR evaluation of the spine with titanium pedicle screws.

Petersilge C A; Lewin J S; Duerk J L; Yoo J U; Ghaneyem A J

Department of Radiology, University Hospitals of Cleveland, Case Western Reserve University, OH 44106, USA.

AJR. American journal of roentgenology (UNITED STATES) May 1996, 166

(5) p1213-8, ISSN 0361-803X Journal Code: 7708173

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

OBJECTIVE: This study examined the contribution and interdependence of multiple imaging parameters in clinical imaging sequences to aid practicing radiologists in minimizing artifacts during MR imaging of the spine after implantation of titanium pedicle screws. MATERIALS AND METHODS: A lumbar spine specimen with titanium pedicle screws implanted in the pedicle was imaged with a 1.5-T scanner. Sequence type, voxel volume, TE, and bandwidth varied. Different voxel volumes were achieved by altering section thickness, field of view (FOV), and matrix size. Artifact size was measured on sagittal and axial images at the midpedicle level. Artifact size was expressed as a percentage of actual screw size, and mean artifact size was calculated for each sequence. Analysis of variance without replication was done. RESULTS: Mean artifact size ranged from 231% to 364% of actual screw size. Artifact size was independent of voxel volume for voxels greater than 3 MM3 ( $p < .001$ ). Artifact size decreased significantly ( $p < .001$ ) when voxel volume was less than 1 mm3. When we increased slice thickness and maintained a constant voxel volume, artifact size decreased. Decreases in artifact size correlated with a reduction in the ratio of the FOV to the number of pixels in the frequency-encoding direction (Nx). Artifact sizes were smallest when fast spin-echo sequences were used. Conventional spin-echo sequences produced artifacts that were smaller than the artifacts produced by the gradient-echo sequences. Decreasing the TE did not diminish artifact size for conventional spin-echo images in larger voxel volume. CONCLUSION: Although voxel volume has been recognized as a factor that affects artifact size, the role of other contributing factors--slice thickness, number of phase-encoding steps, and FOV/Nx--has not been evaluated before. Artifact reduction proved

to be dependent only on FOV/Nx. Artifact size was reduced by the use of fast **spin-echo** sequences. With conventional **spin-echo** sequences, TE should be minimized, although other technical factors may outweigh the gain in artifact reduction.

Descriptors: **Bone Screws**; \***Lumbar Vertebrae--pathology--PA**; \***Magnetic Resonance Imaging--methods--MT**; **Artifacts**; **Cadaver**; **Lumbar Vertebrae--surgery--SU**; **Magnetic Resonance Imaging--instrumentation--IS**; **Magnetic Resonance Imaging--statistics and numerical data--SN**; **Postoperative Period**; **Titanium**

51/3,AB,DE/23

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10168435 22173767 PMID: 12186466

**Implantation** of deep brain stimulators into the subthalamic nucleus: technical approach and **magnetic resonance imaging-verified lead locations**.

Starr Philip A; Christine Chadwick W; Theodosopoulos Philip V; Lindsey Nadja; Byrd Deborah; Mosley Anthony; Marks William J

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Journal of neurosurgery (United States) Aug 2002, 97 (2) p370-87, ISSN 0022-3085 Journal Code: 0253357

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

OBJECT: Chronic deep brain stimulation (DBS) of the subthalamic nucleus (STN) is a procedure that is rapidly gaining acceptance for the treatment of symptoms in patients with Parkinson disease (PD), but there are few detailed descriptions of the surgical procedure itself. The authors present the technical approach used to **implant** 76 stimulators into the STNs of patients with PD and the **lead locations**, which were verified on postoperative magnetic resonance (MR) **images**. METHODS: **Implantation** procedures were performed with the aid of stereotactic MR **imaging**, microelectrode recording (MER) in the region of the stereotactic target to define the motor area of the STN, and intraoperative test stimulation to assess the thresholds for stimulation-induced adverse effects. All patients underwent postoperative MR **imaging**, which was performed using volumetric **gradient-echo** and T2-weighted fast-**spin echo** techniques, computational reformatting of the MR **image** into standard anatomical planes, and quantitative measurements of **lead location** with respect to the midcommissural point and the red nucleus. **Lead locations** were statistically correlated with physiological data obtained during MER and intraoperative test stimulation. CONCLUSIONS: The authors' approach to **implantation** of DBS leads into the STN was associated with consistent lead placement in the dorsolateral STN, a low rate of morbidity, efficient use of operating room time, and robust improvement in motor function. The mean coordinates of the middle of the electrode array, measured on postoperative MR **images**, were 11.6 mm lateral, 2.9 mm posterior, and 4.7 mm inferior to the midcommissural point, and 6.5 mm lateral and 3.5 mm anterior to the center of the red nucleus. Voltage thresholds for several types of stimulation-induced adverse effects were predictive of **lead location**. Technical nuances of the surgery are described in detail.

Descriptors: **Electric Stimulation Therapy**; \***Electrodes, Implanted**; \***Magnetic Resonance Imaging**; \***Neurosurgical Procedures**; \***Parkinson Disease--pathology--PA**; \***Parkinson Disease--surgery--SU**; \***Postoperative Care**; \***Subthalamic Nucleus--pathology--PA**; \***Subthalamic Nucleus--surgery--SU**; **Aged**; **Middle Age**; **Outcome Assessment (Health Care)**; **Parkinson Disease--physiopathology--PP**; **Retrospective Studies**; **Stereotaxic Techniques**; **Subthalamic Nucleus--physiopathology--PP**

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09964963 21888900 PMID: 11891980  
 Effects of iodinated contrast and field strength on gadolinium enhancement: implications for direct MR arthrography.  
 Montgomery Douglas D; Morrison William B; Schweitzer Mark E; Weishaupt Dominik; Dougherty Lawrence  
 Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania.  
 Journal of magnetic resonance imaging - JMRI (United States) Mar 2002, 15 (3) p334-43, ISSN 1053-1807 Journal Code: 9105850  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed  
 PURPOSE: To optimize direct magnetic resonance (MR) arthrography by determining the effect of dilution of gadolinium in iodinated contrast, saline, or albumin on T1-weighted, T2-weighted, and gradient-recalled echo (GRE) images, and the effect of scanner field strength. MATERIALS AND METHODS: Gadopentetate dimeglumine was diluted into normal saline, albumin, or iodinated contrast (0.625 mmol/liter to 40 mmol/liter). Samples were scanned at 1.5T and 0.2T. Signal **intensity** was measured using T1-weighted **spin-echo** (SE), T2-weighted SE, and two- and three-dimensional GRE (20 degrees-75 degrees flip angle) sequences. Graphical analysis of signal **intensity** vs. gadolinium concentration was performed. RESULTS: Albumin had no effect on gadolinium contrast. Dilution of gadolinium in iodinated contrast decreased signal **intensity** on all sequences compared to samples of identical concentration diluted in saline at both 1.5T and 0.2T: with a 2 mmol/liter gadolinium solution at 1.5T, signal was decreased by 26.1% on T1-weighted images, 31.7% on GRE20 images, and 28.9% on GRE45 images, and the T2 value decreased by 71.1%; at 0.2T, signal was decreased by 23.5% on T1-weighted images. On all sequences, the peak signal shifted to the left (lower gadolinium concentration) when diluted in iodinated contrast. Peak signal was also seen at different gadolinium concentrations on **different sequences** and field strength: at 1.5T, peak in saline/iodine was 2.5/0.625 mmol/liter on T1-weighted images, and 2.5/1.25 mmol/liter on GRE20 and GRE45 sequences. At 0.2T, peak in saline/iodine was 0.625-2.5/1.25 mmol/liter on T1-weighted images, 0.625-2.5/1.25 on GRE45 images, 2.5-10.0/1.25-5.0 mmol/liter on GRE65 images, and 1.25-5.0/0.625-1.25 mmol/liter on GRE75 images. CONCLUSION: Dilution of gadolinium in iodinated contrast results in decreased signal on T1-weighted, T2-weighted, and GRE images compared to dilution in saline or albumin for both 1.5-T and 0.2-T scanners; if gadolinium is diluted in iodinated contrast for MR arthrography, a lower concentration should be used because the peak is shifted to the left. The use of iodinated contrast should be minimized, as it may diminish enhancement and lower the sensitivity and specificity of MR arthrography. Optimal gadolinium concentration for MR arthrography is dependent on scanner field strength and a broader range of gadolinium concentration can be used to provide maximal signal at low field strength.  
 Descriptors: \*Arthrography--methods--MT; \*Contrast Media; \*Image Enhancement--methods--MT; \*Iopamidol--diagnostic use--DU; \*Magnetic Resonance Imaging--methods--MT; Gadolinium DTPA--diagnostic use--DU; Phantoms, Imaging; Signal Processing, Computer-Assisted

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09733723 21535081 PMID: 11677456  
 [Osteo-odonto-kerato-prosthesis. Radiographic, CT and MR features]  
 L'osteodonto-cherato-protesi. Aspetti radiografici, TC ed RM.  
 Bellelli A; Avitto A; Liberali M; Iannetti F; Iannetti L; David V

Fondazione Biomedica Europea, Rome, Italy.  
 La Radiologia medica (Italy) Sep 2001, 102 (3) p143-7, ISSN  
 0033-8362 Journal Code: 0177625  
 Document type: Evaluation Studies; Journal Article ; English Abstract  
 Languages: ITALIAN  
 Main Citation Owner: NLM  
 Record type: Completed

**PURPOSE:** Osteo-odonto-keratoprosthesis, a complex eye surgery technique devised by Strampelli, provides a valuable opportunity to restore vision in patients with severe corneal opacification (chemical or thermal burns, bullous keratopathy, severe keratitis, consequences of perforating injuries) in whom corneal transplant or the insertion of synthetic prostheses is contraindicated because of the high risk of rejection. Successful **implantation** of corneal prostheses in these patients was clearly dependent on the use of perfectly biocompatible materials to support the optic. Strampelli demonstrated that thin autologous tooth sections, complete with alveolar-dental ligament fulfilled these requirements, and integrated perfectly with the eye tissues without any risk of rejection. This study aims to present the radiological aspects and postoperative outcome of 13 patients who received osteo-odonto-keratoprosthesis (bilateral in 11 cases and monolateral in 2) evaluated by plain radiography, CT and MRI. **MATERIAL AND METHODS:** Between 1993 and 2001 we evaluated 13 patients who had undergone Strampelli's osteo-odonto-keratoprosthesis, using CT, plain radiography and **MRI**. All patients were examined by plain radiography; 11 patients were also examined by CT and 8 also by **MRI**. The time interval between surgery and the radiological evaluation ranged from 3 to 13 years with a mean follow-up of 5 years and 9 months. **RESULTS:** All patients underwent periodic clinical and imaging examinations in the post-operative period to evaluate the osteo-dental **implant** and to study trophism of the transplant. No post-operative complications, either cicatricial, inflammatory or of any other nature, were clinically suspected. Only two patients showed partial reabsorption of the osteo-dental lamina - evident both on plain film and CT - 10 and 12 years after surgery. Vision was restored in all the patients, with visual acuity of 10/10 in 7 cases. **DISCUSSION AND CONCLUSIONS:** Plain radiography allows to correctly evaluate the position of the prosthesis and detect possible displacements or variations in thickness, but it fails to visualize intraocular soft tissues. Besides allowing visualization and study of the prosthesis, CT also allows optimal evaluation of the intra-orbital structures and early detection of the presence and extension of inflammatory complications that may undermine outcome of the procedure. **MRI** is similar to CT in its capacity to evaluate intra-orbital tissues, but has the advantage of allowing greater contrast resolution thanks to the use of **different** types of **sequences**. However, because of the long image acquisition times, this method is subject to movement artifacts that are less evident in the CT examination which, especially if performed using the spiral technique, has very short image acquisition times.

Descriptors: Cornea--surgery--SU; \*Corneal Opacity--surgery--SU; \***Magnetic Resonance Imaging**; \***Prostheses** and **Implants**; \*Tomography, X-Ray Computed; Biocompatible Materials; Follow-Up Studies; **Prostheses and Implants--adverse effects--AE**; ; Prosthesis Design; Prosthesis **Implantation**; Time Factors; Tooth; Transplantation, Autologous; Treatment Outcome; Visual Acuity

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09648301 21436693 PMID: 11552395  
 Artefacts and ferromagnetism dependent on different metal alloys in **magnetic resonance imaging**. An experimental study]  
 Artefakte und Ferromagnetismus von Metallegierungen in der Kernspintomographie. Eine experimentelle Studie.  
 Thomsen M; Schneider U; Breusch S J; Hansmann J; Freund M  
 Abteilung Orthopadie I, Orthopadische Universitätsklinik Heidelberg.

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Der Orthopäde (Germany) Aug 2001, 30 (8) p540-4, ISSN 0085-4530  
Journal Code: 0331266

Document type: Journal Article ; English Abstract

Languages: GERMAN

Main Citation Owner: NLM

Record type: Completed

The authors evaluated the significance of different metal alloys used in orthopaedic surgery in producing artefacts during **magnetic resonance imaging**. Several MRI sequences were tested and magnetic effects evaluated. Twelve discs made of different metal alloys from three manufacturers were examined. These discs were placed in a plastic box with a defined **position** in ultrasound gel. Then a sensitive, standard T1 weighted **gradient echo** sequence (TE: 4.1 ms; TR 9.4) was carried out in a coronal plane (Matrix 128/256). A Phillips Easy Vision workstation was used for image analysis. The largest area of artefact formation, including the surface size of the disc, was calculated using a special software program. In order to minimise the measurement error all discs were measured 10 times and the average value was determined. Then eight different **sequences** were run and measured in the same way. In a second series, all discs were placed separately on metric paper and subjected to the magnetic field of the **MRI** in order to detect possible motion secondary to the magnetic field applied. The different titanium alloys showed average distortion areas of from 245 mm<sup>2</sup> (Ti6Al4V) to 349 mm<sup>2</sup> (Ti5Al2.5Fe). Cobalt chrome alloys yielded differences of between 600 mm<sup>2</sup> and 651 mm<sup>2</sup> and iron alloys of between 902 mm<sup>2</sup> (316L or Fe18Cr10NiMo) and 950 mm<sup>2</sup> (Fe22Cr10Ni4Mn2MoNb) on average for the standard T1 weighted **gradient echo**. The artefact areas were dependent on the different **sequences** performed. For steel, (Fe18Cr10NiMo) areas of from 411 mm<sup>2</sup> (T1TSE) to 2027 mm<sup>2</sup> (EPI/3D/SPIR) were measured. All sequences studied produced different artefact pictures. None of the materials tested showed changes in **position** secondary to ferromagnetism. The size of signal distortion by **MRI** depends on the alloy making up the **implanted** material and the sequences used. The smallest artefacts occurred with the turbo-**spin-echo** sequences (TSE). The alloys tested in our study seem to carry no risk for patients of ferromagnetically induced secondary loosening caused by **MRI** scanning.

Descriptors: Alloys; \*Artifacts; \*Magnetic Resonance Imaging; \*Magnetics; \*Orthopedics; Hip Prosthesis; Titanium

51/3,AB,DE/27

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09576106 21359029 PMID: 11466257

Evaluation of the G protein coupled receptor-75 (GPR75) in age related macular degeneration.

Sauer C G; White K; Stohr H; Grimm T; Hutchinson A; Bernstein P S;  
Lewis R A; Simonelli F; Pauleikhoff D; Allikmets R; Weber B H

Institute of Human Genetics, University of Wurzburg, Germany.

British journal of ophthalmology (England) Aug 2001, 85 (8) p969-75,  
ISSN 0007-1161 Journal Code: 0421041

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**BACKGROUND:** A long term project was initiated to identify and to characterise genes that are expressed exclusively or preferentially in the retina as candidates for a genetic susceptibility to age related macular degeneration (AMD). A transcript represented by a cluster of five human expressed sequence tags (ESTs) derived exclusively from retinal cDNA libraries was identified. **METHODS:** Northern blot and RT-PCR analyses confirmed preferential retinal expression of the gene, which encodes a G protein coupled receptor, GPR75. Following isolation of the full length cDNA and determination of the genomic organisation, the coding sequence of

GPR75 was screened for mutations in 535 AMD patients and 252 controls from Germany, the United States, and Italy. Employed methods included single stranded conformational polymorphism (SSCP) analysis, denaturing high performance liquid chromatography (DHPLC), and direct sequencing. RESULTS: Nine different sequence variations were identified in patients and control individuals. Three of these (-30A>C, 150G>A, and 346G>A) likely represent polymorphic variants. Each of six alterations (-4G>A, N78K, P99L, S108T, T135P, and Q234X) were found once in single AMD patients and were considered variants that could affect the protein function and potentially cause retinal pathology. CONCLUSION: The presence of six potential pathogenic variants in a cohort of 535 AMD patients alone does not provide statistically significant evidence for the association of sequence variation in GPR75 with genetic predisposition to AMD. However, a possible connection between the variants and age related retinal pathology cannot be discarded. Functional studies are needed to clarify the role of GPR75 in retinal physiology.

Descriptors: \*Expressed Sequence Tags; \*Macular Degeneration--genetics--GE; \*Receptors, Cell Surface--genetics--GE; \*Retina--metabolism--ME; Adult; Binomial Distribution; Blotting, Northern; Case-Control Studies; Chromatography, High Pressure Liquid; Gene Library; Genetic Predisposition to Disease; Macular Degeneration--metabolism--ME; Middle Age; Mutation--genetics--GE; Polymorphism, Single-Stranded Conformational; Reverse Transcriptase Polymerase Chain Reaction

51/3,AB,DE/28

DIALOG(R)File 155:MEDLINE(R)

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09436524 21204840 PMID: 11310921

Brain necrosis after permanent low-activity iodine-125 implants:  
case report and review of toxicity from focal radiation.

Bampoe J; Nag S; Leung P; Laperriere N; Bernstein M  
Division of Neurosurgery, Toronto Western Hospital, Ontario, Canada.

Brain tumor pathology (Japan) 2000, 17 (3) p139-45, ISSN 1433-7398

Journal Code: 9716507

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Focal irradiation has emerged as a useful modality in the management of malignant brain tumors. Its main limitation is radiation necrosis. We report on the radiation dose distribution in the cerebellum of a patient who developed imaging and autopsy diagnosis of radiation necrosis after permanent iodine-125 implants for a solitary osseous plasmacytoma of her left occipital condyle. A 55-year-old woman initially presented with neck and occipital pain and a lytic lesion of her left occipital condyle. A cytological diagnosis of solitary osseous plasmacytoma was made by transpharyngeal needle biopsy. After an initial course of external beam radiation, the patient required further treatment with systemic chemotherapy 21 months later for clinical and radiographic progression of her disease. She ultimately required subtotal surgical resection of an anaplastic plasmacytoma with intracranial extension. Permanent low-activity iodine-125 seeds were implanted in the tumor cavity. Satisfactory local control was achieved. However, clinical and imaging signs of radiation damage appeared 28 months after iodine-125 seed implantation. Progressive systemic myeloma led to her death 11 years after presentation and 9 years after seed implantation. Radiation dose distribution is described, with a discussion of toxicity from focal radiation dose escalation.

Descriptors: \*Brain--pathology--PA; \*Iodine Radioisotopes --adverse effects--AE; \*Radiation Injuries--pathology--PA; Algorithms; Cranial Nerves --pathology--PA; Drug Implants; Iodine Radioisotopes--administration and dosage--AD; Magnetic Resonance Imaging; Middle Age; Necrosis; Plasmacytoma--pathology--PA; Plasmacytoma--radiotherapy--RT; Skull Base Neoplasms--pathology--PA; Skull Base Neoplasms--radiotherapy --RT

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09148283 20450249 PMID: 10997443  
 Effect of superparamagnetic iron oxide on bone marrow.  
 Hundt W; Petsch R; Helmberger T; Reiser M  
 Department of Diagnostic Radiology, Klinikum Grosshadern,  
 Ludwig-Maximilians-University of Munich, Germany.  
 European radiology (GERMANY) 2000, 10 (9) p1495-500, ISSN 0938-7994  
 Journal Code: 9114774  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

The goal of this study was to compare the effects of SPIO particles on the signal **intensity** of the bone marrow of the vertebra spine in patients with and without liver cirrhosis. Forty-eight patients with normal liver tissue and 56 patients with liver cirrhosis were examined before and after intravenous SPIO administration, using a 1.5-T system (Magnetom Vision, Siemens, Erlangen, Germany) with a semiflexible cp-array coil. Three **different pulse sequences** were applied: a T1-weighted **gradient-echo** sequence, a T2-weighted fast **spin-echo** sequence with spectral fat suppression and a T2\*-weighted **gradient-echo** sequence. The signal-to-noise ratio (SNR) of the liver, vertebra bone and paraspinal muscle were obtained. The SNR value change in each patient group and the SNR value difference between the two groups were evaluated. For assessment of statistical significance, Student's t-test with a level of  $p < 0.05$  was applied. No significant differences in the SNR values of the liver and bone marrow between the two groups could be seen with any of the three sequences precontrast. Using the T1-weighted **gradient-echo** sequence in the noncirrhotic liver group, pre- and postcontrast comparisons of the SNR values of the liver and bone marrow indicated a decrease of approximately -44.3% ( $p = 0.02$ ) and increase of approximately 15.3% ( $p = 0.04$ ), respectively. No significant change was seen in the cirrhotic liver group. With the T2-weighted fast **spin-echo** sequence, a significant decrease of the SNR value of the liver and the bone marrow in both groups was seen. With the T2\*-weighted **gradient-echo** sequence, the signal **intensity** decrease of the normal liver tissue was approximately -65.6% ( $p = 0.00$ ), in cirrhotic liver tissue the decrease was -29.9% ( $p = 0.02$ ). The SNR values of the bone marrow showed a decrease of -27.8% ( $p = 0.04$ ) in the noncirrhotic liver group, whereas in the cirrhotic liver group it was only -11.3% and statistically not significant. The effect of SPIO particles on the liver and bone marrow is significantly less in patients with liver cirrhosis.

Descriptors: \*Bone Marrow--pathology--PA; \*Contrast Media; \*Iron  
 --diagnostic use--DU; \*Magnetic Resonance Imaging; \*Oxides--diagnostic use  
 --DU; Adult; Aged; Aged, 80 and over; Liver--pathology--PA; Liver Cirrhosis  
 --pathology--PA; Liver Neoplasms--pathology--PA; Middle Age; Muscle,  
 Skeletal--pathology--PA; Spine

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 DIALOG(R)File 155:MEDLINE(R)  
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09093230 20390910 PMID: 10935226  
 MRI of acute experimental intracerebral hematoma.  
 Hartmann M; Jansen O; Deinsberger W; Vogel J; Sartor K  
 Department of Neuroradiology, University of Heidelberg Medical School,  
 Germany. marius.hartmann@med.uni-heidelberg.de  
 Neurological research (ENGLAND) Jul 2000, 22 (5) p512-6, ISSN  
 0161-6412 Journal Code: 7905298  
 Document type: Journal Article

Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

The purpose of the study was to evaluate the ability of **different MR-sequences** to detect and delineate experimentally produced hyperacute intracerebral hematomas in rats. Twenty male Sprague-Dawley rats received a unilateral hematoma of various volumes by stereotactic injection of fresh autologous arterial blood into the right caudatoputamen. MRI was performed up to 30 min after-generation of each hematoma. We obtained coronal T2- and T1-weighted **spin-echo** images. Furthermore we acquired RF-spoiled 2D- and 3D-FLASH images. MR-images were evaluated for signal behavior, **location**, configuration, size, and volume of each hematoma on a dedicated work station. MR volumetry was correlated to volumetric data obtained from the serial stained histological sections. All hematomas produced signal abnormalities on all sequences in each case. In the majority of cases the hematomas were hypointense. RF-spoiled FLASH 2D- and 3D-sequences showed the best detection of the hematoma owing to their high sensitivity to susceptibility effects. The best correlation between MR- and histological volumetry was found on RF-spoiled FLASH 2D- (corr. 0.81), SE T2- (corr. 0.79), and T1- (corr. 0.74) weighted images. The lowest correlation index was found on the RF-spoiled FLASH 3D-images (corr. 0.51). Signal loss of hematomas on **gradient-echo** images and--to a lesser extent--**spin-echo** T2-weighted images due to susceptibility effects can reliably delineate an acute state, whereas conventional MR scans of ischemic stroke may be normal. MRI may thus be the imaging modality of choice in patients with acute brain attack, especially when it is planned to perform diffusion and perfusion MRI before thrombolytic therapy.

Descriptors: \*Cerebral Hemorrhage--diagnosis--DI; \*Hematoma--diagnosis--DI; \*Magnetic Resonance Imaging--methods--MT; Acute Disease; Rats; Rats, Sprague-Dawley

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 DIALOG(R)File 155:MEDLINE(R)  
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08931803 20220486 PMID: 10756987

Signal changes in liver and spleen after Endorem administration in patients with and without liver cirrhosis.

Hundt W; Petsch R; Helmberger T; Reiser M

Department of Diagnostic Radiology, Klinikum Grosshadern, Ludwig-Maximilians-University of Munich, Germany.

European radiology (GERMANY) 2000, 10 (3) p409-16, ISSN 0938-7994

Journal Code: 9114774

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The goal of this study was compare the effect of Endorem on the signal **intensity** of the spleen in patients with normal liver tissue and in patients with liver cirrhosis. Thirty patients with normal liver tissue and 47 with liver cirrhosis were examined before and after i.v. Endorem administration. The patients were examined with a 1.5-T magnet system (Magnetom Vision) using a semiflexible cp-array coil. Three **different pulse sequences** were used: a T1-weighted **gradient-echo** sequence, a T2-weighted fast **spin-echo** sequence with spectral fat suppression, and a T2\*-weighted **gradient-echo** sequence. The signal-to-noise ratios (SNRs) of two areas of the liver and spleen were determined. The mean SNRs of the liver and spleen in patients with and without liver cirrhosis were compared. For assessment of statistical significance, the t-test at a level of  $P < 0.05$  was applied. After i.v. administration of Endorem, no differences were seen with the T1-weighted **gradient-echo** sequence for the liver and spleen and, with the T2-weighted fast **spin-echo** sequence, no differences were found for the spleen. Significant differences between both groups were seen for the liver with the T2-weighted fast **spin-**



echo sequence. The SNR in the noncirrhotic liver group was 57.4% lower than the SNR in the cirrhotic liver group. With the T2\*-weighted gradient-echo sequence, the SNRs of the liver and spleen in the noncirrhotic liver group, compared with the cirrhotic liver group, were 126.8% and 45.6% less, respectively. The effect of Endorem on the liver in patients with Child C-stage liver cirrhosis was 32.1% less than in patients with Child B-stage liver cirrhosis. Likewise, the Endorem effect on the spleen was 27.1% less in patients with Child C-stage compared with Child B-stage liver cirrhosis. Hepatic and splenic uptake of Endorem is significantly decreased in patients with liver cirrhosis.

Descriptors: \*Contrast Media--administration and dosage--AD; \*Iron --administration and dosage--AD; \*Liver--pathology--PA; \*Liver Cirrhosis --diagnosis--DI; \*Magnetic Resonance Imaging--methods--MT; \*Oxides --administration and dosage--AD; \*Spleen--anatomy and histology--AH; Adult; Aged; Injections, Intravenous; Iron--diagnostic use--DU; Liver --drug effects--DE; Middle Age; Oxides--diagnostic use--DU; Spleen--drug effects --DE; Suspensions

51/3,AB,DE/32

DIALOG(R)File 155:MEDLINE(R)

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08901356 20188461 PMID: 10723494

In vitro investigation of biological and technical prosthetic heart valves using MRI : evaluation of possible deflection and heating of the implants]

In-vitro-Untersuchung von biologischen und technischen Herzklappenprothesen im MRT: Beurteilung möglicher Anziehung und Erhitzung der Implantate.

Kalden P; Prufer D; Schreiber W; Kreitner K F; Oelert H; Thelen M

Klinik und Poliklinik für Radiologie, Johannes Gutenberg Universität Mainz. kalden@radiologie.klinik.uni-mainz.de

RoFo. Fortschritte auf dem Gebiete der Röntgenstrahlen und der neuen bildgebenden Verfahren (GERMANY) Feb 2000, 172 (2) p184-8, ISSN 1438-9029 Journal Code: 9112114

Document type: Journal Article ; English Abstract

Languages: GERMAN

Main Citation Owner: NLM

Record type: Completed

PURPOSE: In vitro evaluation of possible deflection and heating of present-day prosthetic heart valves during MR imaging at 1.5 T.

METHODS: 17 prosthetic heart valves, 12 technical and 5 biological, were investigated using a 1.5 Tesla Siemens Vision system. Deflection was measured at the edge of a 1.5 Tesla superconducting magnet. Each valve was then submerged in a vial of a 1/1 electrolyte solution and temperature was measured before and after imaging with a turbo-spin-echo sequence (TR 5200 ms, TE 138 ms, Flip angle 180 degrees, acquisition time 10.5 minutes, length of echo train 29). MR imaging was performed with phase encoding parallel and perpendicular to the plane of the valves. RESULTS: None of the investigated prosthetic heart valves were deflected. The maximal observed temperature rise was 0.5 degree C. During MR investigation of the prostheses, artifacts caused by metallic parts were less evident using a spin-echo sequence than a gradient-echo sequence. CONCLUSIONS: Patients with the tested present-day prosthetic heart valves can be safely imaged by MRI.

Descriptors: Bioprosthesis; \*Heart Valve Prosthesis; \*Magnetic Resonance Imaging; Prosthesis Design; Prosthesis Failure

51/3,AB,DE/33

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08800609 20083106 PMID: 10616816

The postoperative spine.

Henk C B; Brodner W; Grampp S; Breitenseher M; Thurnher M; Mostbeck G H;

Imhof H

Department of Radiology, Osteology/MR, University of Vienna, Ludwig Boltzmann Institute for Clinical and Experimental Radiology, Austria.

Topics in magnetic resonance imaging - TMRI (UNITED STATES) Aug 1999,  
10 (4) p247-64, ISSN 0899-3459 Journal Code: 8913523

Document type: Journal Article; Review; Review, Tutorial

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

During the last decade, **magnetic resonance imaging** (**MRI**) mostly has replaced computed tomography for evaluation of spinal surgery patients. The inherent advantages of **MRI** are obvious for this particularly difficult field of imaging. With **MRI**, it is possible to demonstrate anatomic as well as pathological and iatrogenic changes in three different imaging planes and countless neighboring planes and to obtain a superior view of the complex postoperative situation regardless of the spinal level imaged. Soft-tissue masses in particular can be identified more readily and located within three-dimensional space. One of the major advantages is that the nature and histology of the mass can be estimated precisely using **different MR sequences** in combination with intravenous contrast media. The most important benefit may be demonstration of inflammatory and hemorrhagic masses in the early postoperative periods (with special emphasis on alterations visible in the spinal cord itself) as well as repair processes and ongoing degeneration in later stages. This visualization is possible even when their extent is limited. In the postoperative spine, the application of **MRI** was facilitated with the advent of new materials, such as titanium alloys, used for surgical instrumentation. These new materials limit the amount of artifacts visible on **MR images**. Earlier **implants** made of other metallic material prohibit the use of computed tomography in the spine. This article provides a brief overview of the progress in spinal surgery and focuses on the developments in **MRI** techniques during the last decade. Technical questions about imaging of spinal instrumentation are discussed. "Normal" postoperative findings needed for interpretation of pathologic conditions are also discussed. Finally, the most important frequently asked questions from referring surgeons that radiologists must be able to answer by **MRI** are presented.

Descriptors: **Magnetic Resonance Imaging**; \*Spine  
--surgery--SU; Alloys; Artifacts; Contrast Media--administration and dosage  
--AD; Image Enhancement; Injections, Intravenous; **Orthopedic Fixation Devices**; Postoperative Care; Postoperative Complications; Postoperative Hemorrhage--diagnosis--DI; Spinal Cord--pathology--PA; Spinal Diseases--diagnosis--DI; Spine--pathology--PA; Spondylitis--diagnosis--DI; Titanium; Tomography, X-Ray Computed; Wound Healing

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DIALOG(R) File 155:MEDLINE(R)

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08740630 20020639 PMID: 10552316

Open **MR imaging** in spine surgery: experimental investigations and first clinical experiences.

Verheyden P; Katscher S; Schulz T; Schmidt F; Josten C  
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European spine journal - official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society (GERMANY) 1999, 8 (5) p346-53,  
ISSN 0940-6719 Journal Code: 9301980

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

INTRODUCTION: The latest open **MRI** technology allows to perform open and closed surgical procedures under real-time imaging. Before performing spinal trauma surgery preclinical examinations had to be done to evaluate

the artifacts caused by the **implants**. **METHODS:** The MRT presented is a prototype developed by GE. Two vertically **positioned** magnetic coils are installed in an operation theater. By that means two surgeons are able to access the patient between the two coils. Numerous tests regarding the material of instruments and **implants** were necessary in advance. The specific size of the artifact depending on the pulse sequence and the **positioning** within the magnetic field had to be examined. **RESULTS:** The magnifying factors of the artifact in the **spin echo** sequence regarding titanium are between 1.7 and 3.2, depending on the direction of the magnetic vector. Regarding stainless steel they are between 8.4 and 8.5. In the **gradient echo** sequence the factors are between 7.5 and 7.7 for titanium and between 16.9 and 18.0 for stainless steel. The tip of an **implant** is imaged with an accuracy of 0 to 2 mm. Since September 1997 16 patients with unstable fractures of the thoracic and lumbar spine have been treated by dorsal instrumentation in the open **MRI**. Percutaneous insertion of the internal fixator has proven a successful minimally invasive procedure. The **positioning** of the screws in the pedicle is secure, the degree of indirect reduction of the posterior wall of the vertebral body can be imaged immediately. The diameter of the spinal canal can be determined in any plane. **DISCUSSION AND CONCLUSION:** The open **MRI** has proven useful in orthopedic and trauma surgery. The size and configuration of the artifacts caused by instruments and **implants** is predictable. Therefore exact **positioning** of the **implants** is achieved more easily. Dorsal instrumentation of unstable thoracolumbar fractures with a percutaneous technique has turned out safe and less traumatic under **MR-imaging**. Real-time imaging of soft tissue and bone in any plane improves security for the patient and allows the surgeon to work less invasively and more precisely.

Descriptors: **Magnetic Resonance Imaging**; \*Spinal Fractures--surgery--SU; \*Spine--pathology--PA; \*Spine--surgery--SU; Artifacts; **Bone Screws**; Equipment Design; Intraoperative Period; Lumbosacral Region; **Magnetic Resonance Imaging** --instrumentation--IS; Postoperative Complications; Postoperative Period; Stainless Steel; Surgical Procedures, Minimally Invasive; Thorax; Titanium

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08361345 95049317 PMID: 7960630

Characteristics of magnetic resonance sequences used for imaging silicone gel, saline, and gel-saline **implants** at low field strengths.

Frankel S; Occhipinti K; Kaufman L; Kramer D; Carlson J; Mineyev M; Friedenthal R

Department of Radiology, University of California, San Francisco.  
Investigative radiology (UNITED STATES) Aug 1994, 29 (8) p781-6,  
ISSN 0020-9996 Journal Code: 0045377

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**RATIONALE AND OBJECTIVES.** Low-field **magnetic resonance imaging (MRI)** evaluation of breast **implants** is described, with emphasis on the capabilities provided by different imaging sequences. **METHODS.** Open architecture **MR images** using a .064-T permanent magnet and three-dimensional Fourier transform and inversion recovery sequences were obtained. A breast coil was designed and built for this project. Symptomatic and asymptomatic patients with silicone, saline-silicone and saline **implants**, and phantoms were part of this study. Phase images were used to differentiate protons in silicone, water, and fat. **RESULTS AND CONCLUSIONS.** Low-field **MRI** permitted differentiation of silicone, water, and fat. **Implant** anatomy and surrounding pathology could be imaged and identified.

Descriptors: **Breast Implants**; \***Magnetic Resonance Imaging**--methods--MT; Adult; Breast--pathology--PA; Breast Diseases --diagnosis--DI; Breast Diseases--etiology--ET; **Breast Implants**

*\*Retros  
Fin STIC  
Jul 30 2003*

--adverse effects--AE; Gels; Middle Age; Models, Structural; Silicones;  
Sodium Chloride

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DIALOG(R)File 155:MEDLINE(R)  
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07864384 93320065 PMID: 8329410

**Magnetic resonance imaging** for assessment of tissue rejection after heterotopic heart transplantation.

Smart F W; Young J B; Weilbaecher D; Kleiman N S; Wendt R E; Johnston D L  
Ochsner Clinic, New Orleans, La.

Journal of heart and lung transplantation - the official publication of the International Society for Heart Transplantation (UNITED STATES)  
May-Jun 1993, 12 (3) p403-10, ISSN 1053-2498 Journal Code: 9102703

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Detection of myocardial rejection is difficult in patients with heterotopic heart transplantation because of the **complex** vascular anatomy present after transplant surgery. To determine whether **magnetic resonance imaging** might be useful for the assessment of heart rejection, eight patients with heterotopic heart transplantation were serially studied on 27 occasions. One patient had two donor hearts **implanted**, which allowed the study of 33 donor hearts. Data acquisition was gated to the ECG signal of the donor heart. Heavily T2-weighted (TE = 90 ms) velocity compensated **spin-echo** images were obtained through the midportion of the donor heart to assess tissue rejection. Donor heart function was qualitatively measured by acquiring multiphasic **gradient echo** images at the same level. A myocardial/skeletal muscle signal **intensity** ratio was calculated for the donor heart and compared to results of right ventricular biopsy obtained within 24 hours of imaging. A change in signal **intensity** ratio of 0.14 or more exceeded normal signal variation. All three episodes of rejection detected by biopsy were detected by **magnetic resonance imaging**. In three instances a significant change in the signal **intensity** ratio was associated with clinical evidence of rejection and a negative biopsy. Two instances were treated with a steroid bolus, and the signal returned to baseline. In three other instances a significant change in the **magnetic resonance imaging** signal occurred without clinical or biopsy evidence of rejection. Cardiac toxoplasmosis was present in one of these cases, and signal **intensity** returned to baseline after treatment. (ABSTRACT TRUNCATED AT 250 WORDS)

Descriptors: Graft Rejection--diagnosis--DI; \*Heart Transplantation; \***Magnetic Resonance Imaging**; \*Transplantation, Heterotopic; Adult; Biopsy, Needle; Electrocardiography; Myocardium--pathology--PA; Postoperative Complications--diagnosis--DI

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07622740 93077924 PMID: 1447496

**Magnetic resonance imaging** and assessment of liver iron content in genetic hemochromatosis.

Guyader D; Gandon Y; Robert J Y; Heautot J F; Jouanolle H; Jacquelinet C; Messner M; Deugnier Y; Brissot P

Department of Radiology, CHRU Pontchaillou, Rennes, France.  
Journal of hepatology (NETHERLANDS) Jul 1992, 15 (3) p304-8, ISSN 0168-8278 Journal Code: 8503886

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Computed tomography (CT) scanning is not highly sensitive in the assessment of liver iron content and magnetic resonance imaging (MRI) appears to be more efficient. The aim of this study was to determine the effectiveness of MRI in the evaluation of liver iron content using a standard **spin-echo** technique. The study included 23 patients with genetic hemochromatosis and 24 non-iron-overloaded patients as controls. A comparison was made of: (a) MRI signal **intensity** of liver, spleen, paravertebral muscles and subcutaneous adipose tissue using two **different spin-echo sequences** (SE 500/28; SE 2000/28,56); (b) liver attenuation determined by a single energy CT scan; and (c) a biochemical determination of hepatic iron. There was a significant decrease in liver signal **intensity** in the genetic hemochromatosis group (256 +/- 201, mean +/- S.D.) compared with the control group (801 +/- 413, p less than 0.001), but there was no correlation with liver iron concentration. However, such a correlation was found and was even more highly significant than in CT when the ratio between the liver and another organ was taken into account. For a lower limit of liver/spleen ratio calculated at 0.46 (mean 2 S.D. in the control group), the specificity (0.96) of MRI was satisfactory, but the sensitivity (0.78) remained insufficient (MRI being unable to detect an iron overload of up to 125  $\mu\text{mol/g}$ ). Hopefully, these results might be improved in the near future by using more sensitive sequences such as **gradient echo** sequences.

Descriptors: \*Hemochromatosis--genetics--GE; \*Hemochromatosis--metabolism--ME; \*Iron--analysis--AN; \*Liver--chemistry--CH; Adipose Tissue--chemistry--CH; Adipose Tissue--metabolism--ME; Adipose Tissue--physiology--PH; Adult; Hemochromatosis--diagnosis--DI; Iron--metabolism--ME; Liver--metabolism--ME; Liver--physiology--PH; Magnetic Resonance Imaging; Middle Age; Muscles--chemistry--CH; Muscles--metabolism--ME; Muscles--physiology--PH; Spleen--chemistry--CH; Spleen--metabolism--ME; Spleen--physiology--PH; Tomography, X-Ray Computed

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07608681 93063753 PMID: 1436418

Protection of iodine-125 brachytherapy brain injury in the rat with the 21-aminosteroid U-74389F.

Bernstein M; Ginsberg H; Glen J

Brain Tumor Research Laboratory, Toronto Hospital-Toronto Western Division, University of Toronto, Ontario, Canada.

Neurosurgery (UNITED STATES) Nov 1992, 31 (5) p923-7; discussion 927-8, ISSN 0148-396X Journal Code: 7802914

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Radiation protection was studied in a rat brachytherapy brain injury model. Radiation lesions were produced by stereotactic placement of high-activity iodine-125 **seeds** on the frontal lobe of F-344 rats. A minimum dose of 80 Gy was delivered to a 5.5-mm-radius volume. Radiation damage was evaluated 24 h after removal of the **seeds** by T1-weighted gadolinium-enhanced **magnetic resonance imaging** on a 1.5-T unit. Computerized three-dimensional reconstruction of the lesions seen on **magnetic resonance imaging** was performed to calculate the volume of radiation injury. Two experiments were performed with rats of different weights (mean, 300 g; mean, 180 g). All animals underwent surgical placement of an indwelling internal jugular catheter before brachytherapy. Treated animals received the 21-aminosteroid U-74389F 5 mg/kg intravenously every 6 hours during the **implant** and for 24 hours after the removal of the iodine-125 **seed**. Control animals were administered vehicle only. In both experiments, a statistically significant reduction in volume of radiation damage was observed in the U-74389F-treated group compared with the control group.

Descriptors: **Brachytherapy**--adverse effects--AE; \*Brain--radiation

effects--RE; \*Iodine Radioisotopes--adverse effects--AE; \*Pregnatrienes  
 --pharmacology--PD; \*Radiation Injuries, Experimental--pathology--PA;  
 \*Radiation-Protective Agents--pharmacology--PD; Brain--pathology--PA;  
 Dose-Response Relationship, Drug; Magnetic Resonance  
 Imaging; Rats; Rats, Inbred F344

51/3,AB,DE/39  
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07556335 93011258 PMID: 1396798

Computed tomography and magnetic resonance imaging in  
 the preoperative work-up for cochlear implantation.

Klein H M; Bohndorf K; Hermes H; Schutz W F; Gunther R W; Schlondorff G  
 Department of Radiology, Technical University Aachen, Germany.

European journal of radiology (NETHERLANDS) Jul-Aug 1992, 15 (1)  
 p89-92, ISSN 0720-048X Journal Code: 8106411

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The role of CT and MRI in the evaluation of patients for possible  
 insertion of a multichannel intracochlear hearing device was appraised. The  
 study included 52 patients who underwent both CT and MRI  
 examinations, 40 of whom were later operated on. Coronal and axial  
 T2-weighted spin-echo sequences were performed in 25 volunteers  
 with normal hearing and in 47 adult patients. In 5 patients, instead of a  
 T2-weighted spin-echo sequence, a T2\*-weighted gradient  
 echo 3D sequence with axial presaturation was used. In 39 patients  
 with normal appearances on CT and MRI, the implant device was  
 successfully inserted. One patient who underwent surgery had a reduced  
 cochlear signal on MRI but a normal CT scan; however, at surgery, the  
 implant device could only be inserted into the first turn of the  
 cochlea, due to fibrous obliteration. In 3 of 12 patients who were not  
 operated upon, the results of diagnostic imaging indicated that the  
 insertion of an intracochlear hearing device was not useful. Our experience  
 indicates that, with reduced cochlear fluid signal intensities on  
 MRI, fibrous obliteration of the cochlear turns is likely to be  
 present. MRI proved to be a useful adjunct to CT, but the latter was  
 necessary for the evaluation of bony abnormalities. Gradient  
 echo sequences can successfully replace time-consuming T2-weighted  
 spin-echo sequences.

Descriptors: Cochlear Implants; \*Hearing Loss, Bilateral--diagnosis  
 --DI; \*Magnetic Resonance Imaging; \*Preoperative Care;  
 \*Tomography, X-Ray Computed; Adolescent; Adult; Aged; Child; Hearing Loss,  
 Bilateral--radiography--RA; Middle Age

51/3,AB,DE/40  
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07323550 92186589 PMID: 1545674

Composite and classified color display in MR imaging of the female  
 pelvis.

Brown H K; Hazelton T R; Fiorica J V; Parsons A K; Clarke L P; Silbiger M  
 L

Department of Anatomy, University of South Florida College of Medicine,  
 Tampa 33612-4799.

Magnetic resonance imaging (UNITED STATES) 1992, 10 (1) p143-54,  
 ISSN 0730-725X Journal Code: 8214883

Erratum in Magn Reson Imaging 1992;10(3) 495

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Because of its superior soft-tissue-imaging capabilities, MRI has proved to be an excellent modality for visualizing the contents of the female pelvis. In an effort to potentially improve gynecological MRI studies, we have applied color composite techniques to sets of **spin-echo** and **gradient-echo** gray-tone MR images obtained from various individuals. For composite generation, based on tissue region of interest calculated mean pixel **intensity** values, various colors were applied to spatially aligned images using a DEC MicroVAX II computer with interactive digital language (IDL) so that tissue contrast patterns could be optimized in the final image. The IDL procedures, which are similar to those used in NASA's LANDSAT image processing system, allowed the generation of single composite images displaying the combined information present in a series of spatially aligned images acquired using **different pulse sequences**. With our composite generation techniques, it was possible to generate seminatural-appearing color images of the female pelvis that possessed enhanced conspicuity of specific tissues and fluids. For comparison with color composites, classified images were also generated based on computer recognition and statistical separation of distinct tissue **intensity** patterns in an image set using the maximum likelihood processing algorithm.

Descriptors: \*Genital Diseases, Female--diagnosis--DI; \*Image Enhancement --methods--MT; \*Image Processing, Computer-Assisted; \*Magnetic Resonance Imaging--methods--MT; \*Pelvis--anatomy and histology--AH; Color

51/3,AB,DE/41

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07250374 92113004 PMID: 1730773

Analysis of Drosophila paramyosin: identification of a novel isoform which is restricted to a subset of adult muscles.

Becker K D; O'Donnell P T; Heitz J M; Vito M; **Bernstein S I**

Biology Department, San Diego State University, California 92182.

Journal of cell biology (UNITED STATES) Feb 1992, 116 (3) p669-81,

ISSN 0021-9525 Journal Code: 0375356

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

In this report we show that *Drosophila melanogaster* muscles contain the standard form of the thick filament protein paramyosin, as well as a novel paramyosin isoform, which we call miniparamyosin. We have isolated *Drosophila* paramyosin using previously established methods. This protein is approximately 105 kD and cross-reacts with polyclonal antibodies made against *Caenorhabditis elegans* or *Heliocopris dilloni* paramyosin. The *Heliocopris* antibody also cross-reacts with a approximately 55-kD protein which may be miniparamyosin. We have cloned and sequenced cDNA's encoding both *Drosophila* isoforms. Standard paramyosin has short nonhelical regions at each terminus flanking the expected alpha-helical heptad repeat seen in other paramyosins and in myosin heavy chains. The COOH-terminal 363 amino acids are identical in standard and miniparamyosin. However, the smaller isoform has 114 residues at the NH2 terminus that are unique as compared to the current protein sequence data base. The paramyosin gene is located at chromosome position 66E1. It appears to use two promoters to generate mRNA's that have either of two **different 5' coding sequences** joined to common 3' exons. Each protein isoform is encoded by two transcripts that differ only in the usage of polyadenylation signals. This results in four size classes of paramyosin mRNA which are expressed in a developmentally regulated pattern consistent with that observed for other muscle-specific RNA's in *Drosophila*. In situ hybridization to *Drosophila* tissue sections shows that standard paramyosin is expressed in all larval and adult muscle tissues whereas miniparamyosin is restricted to a subset of the adult musculature. Thus miniparamyosin is a novel muscle-specific protein that likely plays a role in thick filament structure or function in some adult muscles of *Drosophila*.

Descriptors: \**Drosophila melanogaster*--chemistry--CH; \*Tropomyosin

--chemistry--CH; Amino Acid Sequence; Base Sequence; Cloning, Molecular;  
 DNA--genetics--GE; Drosophila melanogaster--genetics--GE; Drosophila  
 melanogaster--growth and development--GD; Molecular Sequence Data; Muscles  
 --chemistry--CH; Muscles--metabolism--ME; Protein Conformation; RNA,  
 Messenger--genetics--GE; Tropomyosin--analysis--AN; Tropomyosin--genetics  
 --GE

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07225210 92087721 PMID: 1750379

Generation of color composites for enhanced tissue differentiation in  
 magnetic resonance imaging of the brain.

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 Tampa 33612-4799.

American journal of anatomy (UNITED STATES) Sep 1991, 192 (1) p23-34

, ISSN 0002-9106 Journal Code: 0376312

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Currently, the diagnostic interpretation of magnetic resonance (MR)  
 images requires that radiologists integrate specific tissue contrast  
 information from several different images obtained at the same anatomic  
 slice **position**. Each of these images has its own unique tissue  
 contrast patterns which are based on the image acquisition parameters (  
**pulse sequence**) selected. The **complex** contrast patterns  
 observable in these images reflect the inherent biophysical characteristics  
 of the tissues and fluids present in the imaged section. In an effort to  
 increase the diagnostic accuracy and efficiency of MR image interpretation,  
 we have generated color composite images from quantitatively analyzed  
 achromatic MR images of the brain, obtained while utilizing **different**  
**pulse sequences**. By using a DEC MicroVAX II computer with  
 Interactive Digital Language (IDL), this color display method has been  
 applied to images obtained from General Electric Signa and Siemens Magnatom  
 imagers. For this study, our image sets included T1-weighted, T2-weighted,  
 and proton density **spin echo** sequences as well as both high and  
 low flip angle **gradient echo** sequences. Advantages of our color  
 composite methods, in contrast to many other image processing techniques  
 that have been described, are that minimal information is lost, computer  
 misclassification of tissues is avoided, and the conspicuity of specific  
 tissues is enhanced. Furthermore, with this method it is possible to  
 produce composite images whose color renditions approach a natural anatomic  
 tissue appearance. Availability of these color composites to radiologists  
 may improve the efficiency and accuracy of the diagnostic interpretation of  
 MR images.

Descriptors: \*Brain--pathology--PA; \*Image Enhancement--methods--MT;  
 \*Magnetic Resonance Imaging--methods--MT; Color; Evaluation Studies



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06750061 90376180 PMID: 2398389

Brain damage from 125I brachytherapy evaluated by **MR imaging**,  
 a blood-brain barrier tracer, and light and electron microscopy in a rat  
 model.

**Bernstein M**; Marotta T; Stewart P; Glen J; Resch L; Henkelman M  
 Division of Neurosurgery, Toronto Western Hospital, Ontario, Canada.  
 Journal of neurosurgery (UNITED STATES) Oct 1990, 73 (4) p585-93,  
 ISSN 0022-3085 Journal Code: 0253357  
 Comment in J Neurosurg. 1991 Jul;75(1) 166-7; Comment in PMID 2045907  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

Changes in normal rat brain were studied acutely, and at 3, 6, 9, and 12  
 months following interstitial brachytherapy with high-activity 125I  
**seeds**. An 80-Gy radiation dose was administered to an area with a  
 5.5-mm radius. Effects were measured with magnetic resonance (**MR**)  
**imaging** (with and without gadolinium enhancement), leakage of  
 horseradish peroxidase (HRP), electron microscopy, and light microscopy.  
 Significant histological damage was seen at radiation doses above 295 Gy,  
 and breakdown of the blood-brain barrier was observed only in tissue  
 receiving a dose of 165 Gy or greater. Blood-brain barrier breakdown  
 increased up to the 6-month time point, and thereafter appeared to  
 stabilize or decrease. The area of blood-brain barrier disruption indicated  
 by gadolinium-enhanced **MR imaging** was greater than that  
 indicated by leakage of HRP.

Descriptors: **Brachytherapy**--adverse effects--AE; \*Brain--pathology  
 --PA; \*Iodine Radioisotopes--adverse effects--AE; \*Radiation Injuries,  
 Experimental--pathology--PA; Blood-Brain Barrier; Brain--physiopathology  
 --PP; Disease Models, Animal; Horseradish Peroxidase--analysis--AN; Iodine  
 Radioisotopes--pharmacokinetics--PK; **Magnetic Resonance**  
**Imaging**; Radiation Injuries, Experimental--etiology--ET; Radiation  
 Injuries, Experimental--physiopathology--PP; Rats; Rats, Inbred Strains

51/3,AB,DE/45  
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06634652 90260223 PMID: 2343136

**Metallic** ballistic fragments: **MR imaging** safety and  
 artifacts.

Teitelbaum G P; Yee C A; Van Horn D D; Kim H S; Colletti P M  
 Department of Radiology, LAC-USC Medical Center 90033.  
 Radiology (UNITED STATES) Jun 1990, 175 (3) p855-9, ISSN 0033-8419  
 Journal Code: 0401260  
 Document type: Journal Article  
 Languages: ENGLISH  
 Main Citation Owner: NLM  
 Record type: Completed

The ferromagnetism of various bullets and shotgun pellets was tested in  
 vitro. Magnetic deflection showed that four of 21 metallic specimens tested  
 (all bullets) demonstrated marked ferromagnetism. Three of these four were  
 made outside the United States; two of the four were known to contain  
 steel, and the other two were reportedly either copper or  
 copper-nickel-jacketed lead bullets (indicating that the ferromagnetism was  
 due to impurities in the bullet jackets or cores). Ferromagnetic bullets  
 readily rotated within a gelatin phantom in response to magnetic torque.  
 Nonferromagnetic bullets and pellets demonstrated only mild to moderate  
 metal artifact during **spin-echo** and **gradient-echo**  
 magnetic resonance (**MR**) **imaging**. However, all four of the  
 ferromagnetic bullets produced severe MR artifacts and image distortion. MR

\* Review from JTE  
 JAH 3\* 2003

studies of seven patients with retained bullets, pellets, or shrapnel were reviewed. In six of the seven, only mild MR artifacts were seen. Only intracranial shrapnel (presumably steel) in one patient created significant artifact. All seven patients with retained bullets and shotgun pellets were imaged safely with MR. However, caution should be exercised with **MR imaging** in the presence of metallic foreign bodies, particularly if they are located near vital neural, vascular, or soft-tissue structures.

Descriptors: **Foreign Bodies--diagnosis--DI; \*Magnetic Resonance Imaging; \*Wounds, Gunshot--diagnosis--DI; Adolescent; Adult; Middle Age**

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06594894 90220245 PMID: 2325520

The use of Gd-DOTA in **magnetic resonance imaging** of experimentally induced mammary tumors.

Bonnet P A; Michel A; Fernandez J P; Cyteval C; Rifai A; Boucard M; Chapat J P; Lamarque J L

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Magnetic resonance imaging (UNITED STATES) 1990, 8 (1) p71-7, ISSN 0730-725X Journal Code: 8214883

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Gd-DOTA contrast enhancement of **MR images** was evaluated on induced mammary tumors in female rats. A single intravenous injection of the carcinogenic N-nitrosourea ENU was administered to Wistar rats; this simple treatment led to a high percentage of mammary tumors without causing death. All the induced tumors were adenocarcinoma and their heterogeneousness depended on their size. The induced tumors did not have intra- or extravascular inflammatory spaces caused by heterotopic lesions, as is the case with **implanted** tumors. Before injection of Gd-DOTA, appearance of the patchy internal structure was clearly demonstrated on spin-echo images performed with long repetition times. Three doses of the paramagnetic contrast agent (0.1, 0.2, and 0.5 mmol/kg) were evaluated on two **different T1-weighted MR sequences**. Images were recorded before and repeatedly after intravenous injection of Gd-DOTA, and signal intensities and relaxation times were measured. On images acquired with the spin-echo 500/28 as well as the inversion-recovery 928/26/300 sequences, the results showed that 0.2 mmol/kg Gd-DOTA was the optimal dose for contrast enhancement and for clear visualization of the heterogeneousness of the mammary tumor.

Descriptors: **Adenocarcinoma--diagnosis--DI; \*Gadolinium--diagnostic use--DU; \*Heterocyclic Compounds--diagnostic use--DU; \*Magnetic Resonance Imaging--methods--MT; \*Mammary Neoplasms, Experimental--diagnosis--DI; \*Organometallic Compounds--diagnostic use--DU; Contrast Media--administration and dosage--AD; Rats; Rats, Inbred Strains; Time Factors**

51/3,AB,DE/47  
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06265131 89281123 PMID: 2733587

The influence of **pulse sequence** on the relaxation effects of superparamagnetic iron oxide contrast agents.

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Department of Diagnostic Radiology, Yale University School of Medicine, New Haven, Connecticut.

Magnetic resonance in medicine - official journal of the Society of

Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine  
(UNITED STATES) Jun 1989, 10 (3) p289-301, ISSN 0740-3194  
Journal Code: 8505245

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The effects of **different pulse sequences** and timing parameters on the increase in transverse relaxation rate produced by superparamagnetic iron oxide particles have been studied. **Gradient-echo**, single **spin-echo**, and multiple-echo images recorded at 2.0 T were used to evaluate the reduction in signal **intensity** per unit concentration of iron oxide for different echo times and in different media. For the same echo time, **gradient-echo** sequences were found to be more than twice as sensitive to the effects of the agent as single **spin-echo** imaging sequences, while multiple-echo sequences were much less affected than either. Using measurements of the relative effects on **different sequences**, the contributions of different relaxation mechanisms have been quantified.

Descriptors: \*Contrast Media; \*Ferric Compounds--diagnostic use--DU;  
\*Magnetic Resonance Imaging; Models, Theoretical